University of Helsinki
Department of Economics and Management
Publication Nr. 55, Helsinki 2012

Role of Community Forestry in Rural Livelihood and Poverty Alleviation in Ohangwena and Caprivi Regions in Namibia

Tuulikki Parviainen

ACADEMIC DISSERTATION

To be presented,
with the permission of the Faculty of Agriculture and Forestry of the University of Helsinki,
for public examination in Auditorium XII, Main Building of the University of Helsinki,
Unioninkatu 34 on 5 December 2012, at 12 noon.

Helsinki 2012

Supervisor:

Professor John Sumelius
Department of Economics and Management
University of Helsinki
Helsinki, Finland

Reviewers:

Professor Olli Saastamoinen
School of Forest Sciences
University of Eastern Finland
Joensuu, Finland

Dr. Ir. R.A. Schipper
Wageningen University
Wageningen, The Netherlands

Opponent:

Dr Miguel Niño-Zarazúa
United Nations University, World Institute for
Development Economics Research (UNU-WIDER)
Helsinki, Finland

ISBN 978-952-10-8407-2 (paperback)
ISBN 978-952-10-8408-9 (PDF)

ISSN 1235-2241

Unigrafia
Helsinki 2012

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The purpose of this study was to define the role of community forestry in net benefit generation by comparing the cost–benefit analysis (CBA) of community forestry to those of other rural industries namely: forestry, agriculture, wildlife and eco-tourism in two community forests in Namibia during the period 2003–2008. These community forests, which for the most part belong to the Southern African Baikiaea plurijuga (Zambian teak) woodlands, cover a total of 55 918 hectares and 19 888 hectares of which are located in the northern communal area of Namibia. Both communities, Okongo and Kwandu, had been granted legal community forest rights from the Government of Namibia in 2006 and could start to benefit fully from their respective forest areas such as from *inter alia* timber sales.

The CBA that was used in the study included some components of production and rural business management. The CBA explained the importance of community forestry for benefit generation, poverty alleviation and the objective of attaining sustainable forestry in these community forests. Moreover, the Net Benefit Ratios and the Net Benefit Investment Ratios were elaborated. Land and labour productivities of rural industries were also compared. Community level primary data on forestry and conservancy activities in Okongo and Kwandu were collected from the relevant community's sources included: bookkeeping records, community interviews in 2009 and the Okongo household survey in 2007. The household level poverty was calculated by the proportion of the total expenditure on food and the cost of basic needs approach methods in both communities. The headcount index was also used in poverty comparisons. The community level poverty change was calculated from the difference of net benefits for the years 2006 and 2008, and poverty ratios were calculated for this change. However, a 3-year time period was considered to be too short to estimate real change. The study also created scenarios and alternatives for the sustainable community forest development such as REDD-plus, which aimed at indicating how to sustain these valuable and fragile forest areas for the future community forestry and wildlife activities.

Home consumption formed a major part of the agricultural and forestry production in both communities. However, the two communities proved to be quite different from each other. Okongo put emphasis on livestock production whereas Kwandu was wildlife oriented. In addition, the Okongo forest area was a pure community forest and the Kwandu forest area was a combination of community forest and conservancy. Establishing community forestry provided an opportunity for Okongo for benefit generation, whereas Kwandu had already established benefit-generating trophy hunting. At the end of third year i.e. the budget year for

2008/2009 community forestry activities were already well-established in both communities, but their relevant activities had not begun to generate substantial returns. Community forestry activities had not yet alleviated poverty at the household level. Only a few community members, mainly those who were involved in community forestry activities, received some benefits from community forestry. The results showed that a new community activity i.e. conservancy might need about 10 years to attain the level to provide benefit sharing amongst the community members. This might be also the case with community forestry. The group of the 'severely poor' was bigger than expected in both communities, whereas the group of the' poor' in each community was smaller. The Kwandu community was clearly poorer than the Okongo community.

The term 'community forestry' had a diverse meaning in regard to the economies of these two Namibian communities. In a broader meaning, community forestry could help poor communities of Okongo and Kwandu in sustaining their fragile but valuable multiple-use forest areas by sustainable forest management practices. In this the communities will need financial support, which could be in the form of the international climate change payment e.g. REDD-plus, the payment for ecosystem service (PES) or a state subsidy.

Keywords: Namibia, community, revenue, poverty, rural industries, livelihood, community forestry, crop production, animal husbandry, wildlife, eco-tourism and sustainability.

TIIVISTELMÄ

Yhteisömetsätalouden merkitys maaseudun elinkeinona ja köyhyyden vähentäjänä Ohangwenan ja Caprivin lääneissä Namibiassa

Tämän tutkimuksen tavoitteena on määritellä yhteisömetsätalouden merkitys tulonmuodostuksessa vertaamalla yhteisömetsätaloutta muihin elinkeinoihin – metsätalouteen, maatalouteen, riistanhoitoon ja ekomatkailuun – kahdessa yhteisömetsässä Namibiassa vuosina 2003–2008. Nämä yhteisömetsät, jotka suurimmalta osalta kuuluvat eteläisen Afrikan Baikiaea plurijuga (Zambezi-tiikki) -metsätyyppiin, peittävät kaikkiaan 55 918 ja 19 888 hehtaaria ja sijaitsevat Pohjois-Namibian yhteisöalueella. Molemmille yhteisöille, Okongo ja Kwandu, myönnettiin Namibian valtion toimesta lailliset oikeudet perustaa yhteisömetsä vuonna 2006, jolloin ne pystyivät aloittamaan metsiensä taloudellisen hyödyntämisen mm. puunmyynnin muodossa.

Kustannus-hyötyanalyysin avulla selvitettiin yhteisömetsätalouden merkitystä tulonmuodostuksessa, köyhyyden vähentämisessä ja suuntautumisessa kestävään metsätalouteen. Lisäksi muodostettiin elinkeinojen hyöty-kustannussuhteita ja elinkeinojen maan ja työn tuottavuuksia verrattiin toisiinsa. Yhteisötason primaariaineisto kerättiin metsä- ja riistataloudessa Okongossa ja Kwandussa yhteisöjen kirjanpidoista, vuonna 2009 tehdyistä ryhmähaastatteluista ja Okongon vuoden 2007 kotitalouskyselystä. Kotitalouksien köyhyystaso määriteltiin kummassakin yhteisössä kahdella menetelmällä: sekä ruokamenojen osuutena kokonaismenoista että perustarpeiden osuutena. Köyhyysvertailuissa käytettiin myös päälukuindeksiä. Köyhyyden muutos yhteisötasolla laskettiin vuosien 2006 ja 2008 nettohyötyjen erotuksena ja suhdeluvut laskettiin tälle muutokselle. Kolmen vuoden aikaväli osoittautui kuitenkin liian lyhyeksi muutoksen tutkimiseen. Tutkimus tuotti ennusteita ja vaihtoehtoja kestävään yhteisömetsätalouteen suuntaamiseksi eli siihen, miten voidaan ylläpitää näitä arvokkaita ja herkkiä metsäalueita tulevaisuuden yhteisömetsätalouden ja riistatalouden toimintoja varten.

Kotitaloudet kuluttivat suurimman osan maa- ja metsätalouden tuotannosta Okongossa ja Kwandussa. Nämä kaksi yhteisöä osoittautuivat kuitenkin melko erilaisiksi. Okongossa pääpaino oli karjataloudessa, kun taas Kwandu oli suuntautunut riistatalouteen. Lisäksi Okongo oli pelkästään yhteisömetsä, kun taas Kwandu oli yhteisömetsän ja riistanhoitoalueen yhdistelmä. Yhteisömetsän perustaminen antoi Okongolle mahdollisuuden lisätuloihin, kun taas Kwandulla oli jo olemassa lisätuloja tuottava riistatalous. Kolmannen vuoden lopussa, budjettivuonna 2008/2009, yhteisömetsätalouden toiminnot olivat jo perustettuina molemmissa

yhteisöissä, mutta ne eivät tuottaneet merkittäviä tuloja. Yhteisömetsätalous ei vielä ollut alkanut vähentää kotitalouksien köyhyyttä. Vain muutamat yhteisöjen jäsenet, pääasiassa ne, jotka osallistuivat yhteisömetsätalouden toimintoihin, saivat joitakin hyötyjä yhteisömetsätaloudesta. Tulokset osoittivat, että uusi aktiviteetti yhteisössä kuten riistatalous, tarvitsee noin kymmenen vuotta saavuttaakseen tason, jolloin tulojen jakaminen yhteisön jäsenille on mahdollista. Näin tapahtunee myös yhteisömetsätalouden osalta. Molemmissa yhteisöissä äärimmäisen köyhien ryhmä oli odotettua suurempi, kun taas köyhien ryhmä oli vastaavasti odotettua pienempi. Kwandu oli selvästi köyhempi kuin Okongo.

Yhteisömetsätaloudella on myös erityinen merkitys näille kahdelle namibialaiselle yhteisölle. Yhteisömetsätalous voi auttaa köyhiä Okongon ja Kwandun yhteisöjä säilyttämään hauraat mutta arvokkaat monikäyttömetsäalueet kestävän metsätalouden kautta. Tässä yhteisöt tarvitsevat taloudellista tukea, joka voi tulla kansainvälisen ilmastorahoituksen (esim. REDD+), ekosysteemipalvelutuen tai valtion tuen kautta.

Avainsanat: Namibia, yhteisö, tulot, köyhyys, elinkeinot, toimeentulo, yhteisömetsätalous, viljanviljely, karjanhoito, riistatalous, ekomatkailu ja kestävyys.

ABBREVIATIONS

AB	Agronomic Board
ADB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
BAP	Bali Action Plan
BBEE	Broad-based Black Economic Empowerment
BCR	Benefit–Cost Ratio
CBA	Cost–Benefit Analysis
CBNRM	Community-Based Natural Resource Management
CBO	Community-Based Organisation
CDM	Clean Development Mechanism
CEB	Crop Enterprise Budgets
CFG	Community Forestry Guidelines
CHS	Census Household Survey
DAP	Drought Animal Power
DEA	Directorate of Environment Affairs
DED	German Development Corporation
DOF	Directorate of Forestry
DSS	Directorate of Scientific Services
EU	European Union
FAN Meat	Farm Assured Namibia Meat Scheme
FAO	Food and Agriculture Organization
FMC	Forest Management Committee
FMP	Forest Management Plan
FSP	Forestry Strategic Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GNI	Gross National Income
GNP	Gross National Product
GRN	Government
GtC	Giga ton of Carbon
GVA	Gross Value Added
HACSIS	Human Animal Conservation Self Insurance Scheme
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
HPI	Human Poverty Index
ICEMA	Integrated Community-Based Ecosystem Management Project
IECN	Integrated Environmental Consultant Namibia

IFPRI	International Food Policy Research Institute
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
Life Project	Living in a Finite Environment
LSU	Livestock Unit
MAWF	Ministry of Agriculture, Water and Forestry
MB	Meat Board
MDG	Millennium Development Goal
MEATCO	Meat Corporation of Namibia
MET	Ministry of Environment and Tourism
MHSS	Ministry of Health and Social Services
MRV	Measurement, reporting and verification
MTP	Third Medium-Term Plan
NACOBTA	Namibian Community Based Tourism Association
NAFWU	Namibia's Farm Workers' Union
NAU	Namibia Agriculture Union
NBIR	Net Benefit–Investment Ratio
NDP	National Development Plan
NFFP	Namibia-Finland Forestry Programme
NFP	National Forestry Policy
NGO	Non-Governmental Organization
NGOF	National Gross Output for Forests
N$	Namibian dollar
NHIES	Namibia Household Income and Expenditure Survey
NNF	Namibia Nature Foundation
NNFU	Namibia National Farmers Union
NPC	National Planning Commission
NPCS	National Planning Commission Secretariat
NRM	Natural Resource Management
NPRAP	National Poverty Reduction Action Programme
NPV	Net Present Value
NSB	Namibia Stud Breeders
NTB	Namibian Tourism Board
NTFP	Non-timber forest product
OPM	Office of Prime Minister
OVC	Orphans and Vulnerable Children
PES	Payment for Environmental Services
PHC	Population Housing Census
PMS	Poverty Monitoring System
PMSY	Poverty Monitoring Strategy
PPA	Participatory Poverty Assessment

PPP	Purchasing Power Parity
PPS	Probability Proportionate to Size
PRS	Poverty Reduction Strategy
PSU	Primary Sampling Unit
RDP	Regional Development Plan
REDD	Reducing Emissions from Deforestation and Degradation
RPP	Regional Poverty Profile
RRA	Rapid Rural Appraisal
SADC	Southern African Development Community
SIAPAC	Social Impact Assessment and Policy Analysis Corporation
SME	Small and Medium-size Enterprise
SPSS	Statistical Package for the Social Sciences
STATA	Data Analysis and Statistical Software
STI	Sexually Transmitted Infection
tCO_2	tonnes of Carbon Dioxide
UNAM	University of Namibia
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US$	United States dollar
WILD Project	Wildlife Integration for Livelihood Diversification Project
WTTC	World Travel and Tourism Council

DEDICATION

I dedicate this work to two late primary school teachers of the Parviainen family, my father Eino and my aunt and godmother Hanna, who devoted their entire lives to education and teaching and showed concretely in their own lives that education is the way out of poverty.

PREFACE

The two research sites; Okongo Community Forest and Emerging Conservancy in Ohangwena Region and Kwandu Community Forest and Conservancy in the Caprivi Region were active and cooperative partners in this research project entitled 'Role of Community Forestry in Rural Livelihood and Poverty Alleviation in Ohangwena and Caprivi Regions in Namibia'.

The study was carried out in cooperation with the Directorate of Forestry (DOF) of the Ministry of Agriculture, Water and Forestry (MAWF) in Namibia, and the Directorates of Environment Affairs (DEA) and Scientific Services (DSS) of the Ministry of Environment and Tourism (MET) in Namibia, especially with the Global Environment Facility (GEF) funded ICEMA (The Integrated Community-Based Ecosystem Managment) Project in household surveys and data collections in Okongo and Kwandu.

The Rössing Foundation, Namibia Nature Foundation (NNF) and German Development Corporation (DED) were partners in funding the Okongo Household Survey in 2007. The household survey's field work was carried out by SIAPAC (Social Impact Assessment and Policy Analysis Corporation). In 2007 the cooperation started with the Environment and Production Technology Division of the International Food Policy Research Institute (IFPRI) in Washington DC, and had some cooperation with the World Bank's Environment Department with the household survey questionnaire.

The Academy of Finland funded this Research Project via its Development Research Funding for 2007–2010. The Niemi Foundation funded the IFPRI cooperation activities. Some extra funding for this project was received from the Finnish Society of Forest Science, the Finnish Association of Academic Agronomists, the University of Helsinki and the Finnish Society of Sciences and Letters.

The study was carried out while being a member of the Sustainable Agriculture and Rural Development Research Group (SARG) in the Department of Economics and Manaagement, University of Helsinki.

ACKNOWLEDGEMENTS

A word of thanks to Professor John Sumelius in the Department of Economics and Management at the University of Helsinki for helping this work to commence and for following it through to the end. Special thanks to my two tutors Dr Ephraim Nkonya at the International Food Policy Institute (IFPRI) in Washington DC and Dr Jonathan Barnes in Windhoek, Namibia. I am grateful to my dissertation pre-examiners, Professor Olli Saastamoinen at University of Eastern Finland and Dr Rob Schipper at Wageningen University in the Netherlands who gave valuable comments that added value to my work. I wish to thank Dr Miguel Niño-Zarazúa at United Nations University, World Institute for Development Economics Research (UNU-WIDER) for the honour to be my opponent. Many thanks to Dr Timo Sipiläinen in the Department of Economics and Management at the University of Helsinki for his valuable comments and amendments on agricultural issues, and Prof. Markku Kanninen in the Department of Forest Sciences for his valuable comments on REDD and forestry. Thanks also to Prof. Olavi Luukkanen for helping the work to commence. I am grateful to Dr Mary Seely's constructive and valuable comments on poverty issues of Namibia and Dr Marko Katila's comments on economic and structural issues.

Many thanks to two Namibian Permanent Secretaries, Dr Malan Lindeque and Mr Kahijoro Kahuure who assisted in finding a practical and useful topic for my study. My compliments to Director, Mr Joseph Hailwa in the Directorate of Forestry in the Ministry of Agriculture, Water and Forestry of Namibia and his staff at the headquarters, regions and districts who helped in the field work. Thanks are also due to Director, Mr. Teofilus Nghitila for his cooperation in the Directorate of Environmental Affairs in the Ministry of Environment and Tourism of Namibia.

Many thanks to Dr Chiara Lombardini, Dr Vesa Niskanen, Prof. Matti Ylätalo, Prof. Visa Heinonen and Doctoral Students Sari Mäki and Heikki Mäkinen in the Department of Economics and Management at the University of Helsinki for their practical help. I thank Dr Alisdair Mclean, Mrs Tiina Ojamo, Mrs Kirsi Elo and Mrs Riikka Hyypiä who helped in finalizing the printed version. I would like to thank Dr Newton Nyairo, Dr Sari Ollila and Dr Nina Hyytiä, my colleagues, for spurring me on to complete this work, and Mrs Kirsi-Marja Mustonen, Mrs Nina Niemeläinen and Mrs Outi Pajunen for looking after the overheads and other practical matters of the project. I also thank all my other colleagues at the University of Helsinki. They know who they are. Special thanks to my friends and relatives for understanding that I had to say 'no' to so many invitations and events, not because I wanted to but because of my commitment to this study. Lastly, major thanks to Okongo and Kwandu Community Forests for being the pilot areas and crucial part of the study.

ASSUMPTIONS

The poor depend more on natural resources than the well-off. Communities who live in low resource potential areas may have to use their resources carefully in order to meet their subsistence needs.

DEFINITION OF CONCEPTS

Poverty gap: Difference in revenue (including household income) between poor households' expenditure and the poverty line.

Livelihood: Sources of livelihood at the household or community level.

Total return: Consists of household income, home consumption, external revenues and changes in a household's stocks. In this study the home consumption forms a large part of the total return.

Home consumption: Household's own consumption.

Salary: Income demand for labour.

Opportunity cost: Hourly income, which is the next best choice that one forgoes when making a decision to choose between two remunerative activities.

Natural capital: Natural resources; land, forests, water, wildlife and pastures.

Physical capital: Privately owned assets that can be used to increase labour and land productivity includes; livestock, tools and machinery.

Financial capital: Cash (income and savings) and liquid capital.

Human capital: A set of skills that an employee acquires on the job, through training and experience, and which increase that employee's value in the market place.

Social capital: The ability of people to work together in groups and organizations for a common purpose.

Absolute poverty: Insufficient resources to meet basic human needs (clear and fresh water, nutrition, health care, education, clothing and shelter).

Relative poverty: When an indivual lacks a usual or socially acceptable level of resources or income compared with others within a society or country.

1. INTRODUCTION

1.1 BACKGROUND

The economic role of many rural industries, in particular community forestry, in poverty alleviation in communal areas in Namibia is not yet well-known. Only a few studies have been carried out on the economic effects of community forestry in developing countries, Dahal (2006). Consequently there is a lack of reliable community level economic data on the benefits and costs of community forestry activities. Reliable and extensive data is a prerequisite for cost–benefit analysis study. The economic data of a rural community develops and increases at the same pace as other community development. The less developed a community is, the less economic data it has. This study attempts to provide more information on the financial and economic effects of forestry/community forestry in communal areas in Namibia. It focuses on the revenue generation of these community forests compared to other main rural industries i.e. agriculture, wildlife and eco-tourism in the Okongo and Kwandu community forest areas.

The Republic of Namibia is located in Southern Africa. The western border of Namibia is formed by the Atlantic Ocean, in the north of Namibia borders are shared with Angola and Zambia. In the east Namibia has common borders with Botswana and Zimbabwe, and in the south and east with South Africa. The size of the country is 825 418 km^2. Namibia has 13 regions (Figure 2.1). The population size is about 2 million and the rural population accounts for 67 per cent. The population growth rate of Namibia in 2005–2010 was 1.87 (UN 2010).[1]

Namibia is ranked as an Upper Middle Income Country (US$ 3 856–11 905)[2] with a Gross National Income (GNI) of US$ 4 200 by the World Bank Atlas method, which is based on per capita GNI in 2008 (World Bank 2009).[3] However, a substantial inequality in the income distribution, standard of living and quality of life exists in Namibia and the society is thus dichotomized. The Gini coefficient, which determines a society's inequality by comparing the income and expenditure distribution, was 0.604 in 2003/2004 (NPC 2008a). By comparison the same coefficient was 0.58 in the Southern African Development Community (SADC) area during the same period.[4] Ravallion (2005) stated that inequality limits the poor to

1 The annual population growth rate was 2.6 per cent in 1991–2001 and 1.5 per cent in 2003 (ADB 2006).

2 US$1 = Eur0.7. Middle income countries are subdivided into lower middle and upper middle.

3 The figure was obtained by the same method as in 2009 US$4 270 (World Development Indicators, World Bank 2010).

4 The Gini coefficient value varies between zero and one. The closer the value is to one the more unequal the society.

share the opportunities in the growing economy. The higher the proportion of poor people in an economy the lower will be the rate of growth (Ravallion 2007). Rapid poverty reduction needs more growth and reduced inequality.

The Namibian poverty is mainly a rural phenomenon. Historical reasons and racial segregation have led to many poor people to live in communal areas where unemployment, a relatively poor performance of subsistence agriculture, a high population growth and HIV/AIDS are still common. According to the poverty related statistics, the San Community[5] is the most vulnerable group in Namibia. In 2003/2004 about 63 per cent of the San people lived in poverty (NPC 2008a). The San, who do not grow their own food, depend wholly on a government relief programme as reported the Namibia Household Income and Expenditure Survey (NHIES 1993/1994) and they still have inadequate access to education, health care, safe water and proper shelter. Their literacy rate, that is the proportion of the population over the age of 15 that can read and write, was 47 per cent. In addition, the gross enrolment rate, which expresses the portion of students enrolled in primary, secondary and tertiary level of education, was 34 per cent in 2003/2004.

The development of rural areas in Namibia and their different rural industries is included in Vision 2030, which is a long-term policy framework for national development and consists of seven National Development Plans (NDPs). Poverty reduction is a priority for the on-going Third National Development Plan (NDP3) (2007–2012). The Government of Namibia aims to support different rural industries according to their importance in poverty alleviation and community development when their roles are clarified.

Until recently, the Government of Namibia has not been fully aware of its own forest resources. Forestry has been regarded as a devalued sector. However, in 2004 a summary of forest inventory showed that Namibia has at least 16 million hectares of forests that are located in the northern part of the country, namely: The Ohangwena, Kavango and Caprivi Regions. In 2005 the First National Accounts on Forestry gave indications that forestry has indeed some importance in the economy of rural areas. The first estimate on forestry's contribution to the national economy was 1.2 billion Namibian dollars[6], which accounts for about 3 per cent of GNP in 2004.

The role of forests in poverty alleviation is a topic that is hardly discussed. Globally, forests form a safety net for the rural poor; some 1.6 billion people worldwide rely on forest resources (World Bank 2001). These forest dependent people can be classified into four groups: people who 1) heavily depend on forests but are more likely to choose agriculture to get out of poverty, 2) people who use nearby forests for some revenue, 3) people who make use of trees on their own

5 About 30 000 people, 2 per cent of Namibia's population (Suzman, 2001).

6 1 Euro = 10 Namibian dollars (N$). On 11 October 2006, 1 Euro = 10.0768 Namibian dollars (N$).

land, and 4) process and trade forest products (Byron and Arnold 1999; Oksanen et al. 2003). The forest products increase the revenue stability at difficult times. Resources from forests and surroundings including thatch grass, reeds, poles and fuel wood are important for poorer households and serve as a safety net. This also applies to poorer households in Okongo Community Forest in Ohangwena and Kwandu Community Forest and Conservancy in Caprivi in Namibia.

Nowadays the Government of Namibia promotes community forestry in which forest resources are managed by the local communities themselves. In 2006 the Government of Namibia finalised the gazettement process of 13 first community forests whereby an official declaration communities received legal rights to revenues from their forest areas and by which the land tenure of the forest area improved. These community forests can generate revenue through firewood, timber, poles, thatch-grass, non-timber forest products and medicinal plants, such as tubers of the 'Devil's Claw' plant. The community can also enter into contracts of commercial exploitation. Earlier, before the legal status of community forests were established, community members could only use their forests for home consumption. The remaining forest revenue belonged to the Government. These first community forests in Namibia cover some 341 523 hectares and both research sites, Kwandu in Caprivi Region and Okongo in Ohangwena Region, belong to them. The Directorate of Forestry (DOF) is in the process of declaring and developing more community forests (NPC 2008a).

Conservation is one of the key issues for the environmentally fragile and valuable Namibian forest resources. The Reducing Emissions from Deforestation and Degradation (REDD) might be modified into a new tool for sustainable community forestry in Namibia, namely REDD-plus, other Payments for Environmental Services (PES) tool or the state environmental subsidy. The REDD-plus tool was created to reduce forest loss in developing countries which is where most of the carbon emissions from deforestation and degradation occur. Urgent global measures are needed to stop the adverse effects on climate, thus emissions have to be strongly and rapidly reduced (Hari and Kulmala 2009). The REDD-plus tool could be one additional way in this achieving huge task. The REDD-plus, PES or state environmental subsidy tools could motivate the community members to head to the sustainable community forestry.

The REDD-plus tool also includes conservation, sustainable management of forests and enhancement of forest carbon stocks. In Namibia the National Forest Policy (NFP) (2005) recognises that Namibia's woodlands and wooded grasslands provide carbon sinks. This is executed in accordance with REDD-plus by which the avoidance of emissions caused by land conversions that reduce carbon storage is compensated. In this study scenarios were calculated for Okongo Community Forest in Ohangwena and Kwandu Community Forest in Caprivi.

The arid conditions in Namibia limit agricultural productivity, for the country is one of the driest in sub-Saharan Africa, a semi-arid country. The predicted climate change would even worsen the situation. Rainy seasons in Namibia are already following erratic patterns (IECN 2008). A trend towards greater aridness could shift farming further towards small stock and game (NPC 2002). Today, Namibian agriculture covers a wider spectrum of large commercial, small commercial and subsistence scales. Livestock farming and dry land crop production dominate the industry. Small-scale cereal growing and livestock farming are practised on 5.5 million ha, cattle ranching on 31.5 million ha and small stock farming on 27 million ha in Namibia. About 59 per cent of Namibia's cattle, 10 per cent of sheep and 72 per cent of goats are produced in communal areas (Agronomic Board 2007).

In 2003/2004 subsistence agriculture was the main source of revenue for 28.9 per cent of households whereas salaries and wages accounted for 46.3 per cent of households (NPC 2008a) in the Namibian rural areas. This is in concordance with the findings of Barret et al. (2001), who stated that non-farm sources may account for 40–45 per cent of an average rural household's revenue. The average revenue for a matriarchal household in Namibia was a half of that of her male counterpart (NHIES, 1993/1994). Between 1993/94 and 2003/04 the real production in subsistence agriculture in Namibia did not increase and may even have declined. Subsistence agriculture does not reduce poverty in Namibia, and moving people out of subsistence agriculture is a more appropriate way to alleviate poverty.

Community members of Okongo and Kwandu, especially the poor, regard agriculture, that is crop production and traditional livestock keeping as the most important rural industry. This fact came out in the recently published regional poverty profiles of Ohangwena and Caprivi (NPC2004c; NPC 2006a) and also in this research project's group interviews among the Forest Management Committee members in Okongo and Kwandu in 2006–2009. Ohangwena and Caprivi are among the poorest regions in Namibia and for the poor, food production is the most important rural industry. However, the agricultural productivity is low in the communal areas. In Namibia agricultural production in communal areas is mainly for home consumption, not for sale, so that it does not increase community members' living standards *per se*. The high prevalence of HIV; 17.8 per cent among pregnant women in 2008 (MHSS 2008) is one of the causes for the low agricultural productivity in communal areas since HIV infection reduces the work contribution in field work.

Community-based tourism and wildlife tourism broaden the revenue scope of communities. These require investments and capacity from the community but can be lucrative and reduce poverty in a community. In Okongo and Kwandu the share of tourism is still modest but both communities regard tourism as an important future revenue source, which is expected to improve the living standard and decrease poverty in communities.

The wildlife sector has high multiplier effects in tourism. Barnes et al. (2001) calculated that in Botswana a N$1 million increase in the wildlife-based tourism output is likely to increase the gross output in the economy by some N$0.9 million. That Botswana based study suggests that wildlife and eco-tourism could also be profitable rural industries in Namibia in those areas that are dense in wildlife and they could give much better revenues than either subsistence agriculture or forestry. The Caprivi region in Namibia, which is situated close to the famous Okavango Delta in Botswana, has potential for nature conservation. The Government of Namibia is promoting conservancy projects in which local communities manage their wildlife resources according to hunting quotas received from the central administration. Communities can have joint tourism ventures or they can lease out areas for safari hunting and wildlife viewing. The remaining hunting quotas can be allocated to community members for meat. The largest profits come from high game density areas. In low density and lower diversity areas the potential revenues per land unit are much lower. Additional revenues can be received from game meat and hand-crafts production. In Kwandu the wildlife densities are high enough for hunting and game viewing tourism to be viable. There is also beautiful scenery associated with the Kwando River and floodplain, which further enhance the potential for tourism. In Okongo the wildlife densities are quite modest due to the region having a higher population density and also due to the aftermath of the war in Angola, which had reduced the area's game population significantly. The habitat in Okongo area is also somewhat monotonous, which reduces the potential for wildlife viewing safari tourism. Therefore any potential there for wildlife uses are likely to be restricted to hunting tourism.

1.2 AIMS OF THE STUDY

The first objective of this study was to define the role of community forestry in net benefit generation by comparing the CBA of community forestry to those of other rural industries namely: forestry, agriculture, wildlife and eco-tourism. In these comparisons net benefit–cost ratios and net benefit – investment ratios were also used. Land and labour productivities were calculated for rural industries. The second aim was to define the importance of community forestry in poverty alleviation in Okongo Community Forest and Emerging Conservancy and Kwandu Community Forest and Conservancy between the years 2006 and 2008. The third aim was to show the general trend of the community development in agriculture, forestry, wildlife and eco-tourism. The fourth aim was to find ways to achieve the sustainable forest management at the community level.

The basis for the CBA studies were the Okongo (2007) and Kwandu (2006) household survey data (agriculture, forestry and other community activities) with the

community bookkeeping data (community forestry, conservancy, community tourist camp site and other new community activities) in 2003–2008 and community interviews on costs and prices in 2009. These yielded the basic yearly data for home consumption and sales of agriculture, forestry, wildlife, eco-tourism and other community activities. The collected household survey data of Okongo constituted primary data such as the Okongo and Kwandu community bookkeeping data. They have not been used earlier in any analyses or studies.

The overall hypothesis was that the role of forests (home consumption, sales and community forestry) in revenue generation is under-estimated in benefit generation in communities. Moreover, this under-estimation is mainly due to a lack of adequate information about forest resources and their economic values and uses, especially that of home consumption.

In order to test this hypothesis, tables on benefits, costs and net benefits were calculated for different rural industries: agriculture, forestry, community forestry (common forestry activities), wildlife and other community activities in Okongo and also Kwandu Community Forests for the years 2003–2008. The purpose was to clarify the general economic trend of these rural industries in the area, and their effects on the economy of the communities. The role of community forests in poverty alleviation was elaborated from the change of the communities' total net benefits and the net benefits of forestry (where community forestry was a new activity) before and after receiving the legal rights of community forestry. Herein Okongo's and Kwandu's community level detailed bookkeeping information on community forestry, according to the Namibian budget year in 2006 (1 April 2006 – 31 March 2007) and 2008 (1 April 2008 – 31 March 2009) was used. No community forest timber sales were made in the budget year 2006/2007[7]. In addition, this study analysed how the profitability of forestry changed when the communities started to benefit from their own forest resources. However, the time period for evaluating this change was very short, only two years.

The portion of possible environmental incentives for sustainable forest management in communities generated from the REDD-plus, PES or the state subsidy tools was calculated.

The study was carried in two phases. In Phase I (2003-2005) the communities did not have legal rights to generate revenues from their own forest resources. Such resources were only used for community members' home consumption. The hypothesis was that the output of the forest is below its potential even though home consumption of forest products is significant. For the poor the other rural industries were expected to be more important than forestry, especially crop cultivation. In Phase II (2006–2008) the communities had legal rights (after a gazettement) to

7 1 April 2006 – 31 March 2007.

generate revenue from their own forest resources. The hypothesis was that the role of the forest is more significant in the economy of the community. The poor were expected to start receiving benefits through the forest revenue distribution.

The earlier Okongo and Kwandu forestry and conservancy projects of 1998–2006 were regarded as real capital and human capital investments for the future community development. Consequently, the communities did not start from zero in 2006. When they received recognition of the community forestry rights, they already had the basis for their common forestry activities established.

The study consists of nine chapters. This first chapter 'Introduction' describes the background and the aim of the study. The second chapter presents features of poverty in Namibia. The third chapter 'Rural industries and livelihoods in Namibia' describes Namibian forestry, agriculture, wildlife and eco-tourism in the studied communal areas. The fourth chapter surveys earlier studies/literature that are relevant to this study. The fifth chapter describes the CBA method and its application to poverty study, net benefit–cost ratio and net benefit – investment ratio methods, and a method to calculate land and labour productivities. The sixth chapter describes the data obtained. The seventh chapter presents the results and answers to the question as to whether community forests have any impact in poverty alleviation in Okongo and Kwandu Community Forests. The eighth chapter presents the discussion, and the ninth chapter presents the conclusions and recommendations.

2. POVERTY IN NAMIBIA

Poverty and extreme poverty in Namibia are defined in Chapter 2 Section 1. Chapter 2 Section 2 describes poverty reduction and includes the use of Participatory Poverty Assessment (PPA) and the Household Surveys in Okongo and Kwandu in defining the poverty. The chapter on poverty is based mainly on Martin Ravallion's definitions and theories on poverty.

Globally the number of people in absolute poverty has declined over the last 25 years, but in Africa the number is still increasing (Collier 2007). Over 1 billion people, who live in extreme poverty, depend on forests for their livelihoods (IUCN 2007). In Namibia unemployment, relatively poor performance of subsistence agriculture, population growth and HIV/AIDS are common in communal areas, and they all are linked to poverty.

Poverty responds to growth slowly in the high inequality countries. Such inequality countries need unusually high growth rates to achieve rapid poverty reduction. Ravallion (2007) states that in a high inequality country with a Gini coefficient of 0.60[8], it will take 57 years to halve the initial poverty rate. Moreover, the Gini coefficient may not reflect on how well changes in distribution have impacted upon poverty (Ravallion and Chen, 2007). For example, an unchanging Gini coefficient with growth can mean large increases in absolute revenue disparities (Ravallion 2007). According to Ravallion some inequalities are positive and they reinforce the market-based incentives to foster innovation, entrepreneurship and growth.[9] Ravallion (1995) has noted that when the poor can take advantages of opportunities, the absolute poverty can fall rapidly. In contrast, high inequalities that stem from disparities in human resource development, impede future growth and poverty reduction. According to Ravallion and Chen (2003), 'pro-poor' growth is the growth that reduces poverty. In high inequality countries such as Namibia, the growth has to be simultaneous with falling inequality, if the the aim is to reduce poverty. A high priority must be given to public action that can help the poor people acquire the skills needed to participate in the growth process (Ravallion 2007). According to Collier (2007) the redistribution in middle-income regions could radically reduce absolute poverty. Consequently, developing countries such as Namibia should try to increase their economic efficiencies to encourage the economic growth and the redistribution of revenue from the rich to the poor.

In Namibia HIV/AIDS must be taken into account within the context of poverty. HIV/AIDS affect most young adults who belong to the production segment. The

8 By using the growth at the same rate and with the same initial headcount index.

9 An inequality country: A country that has a high Gini coefficient value.

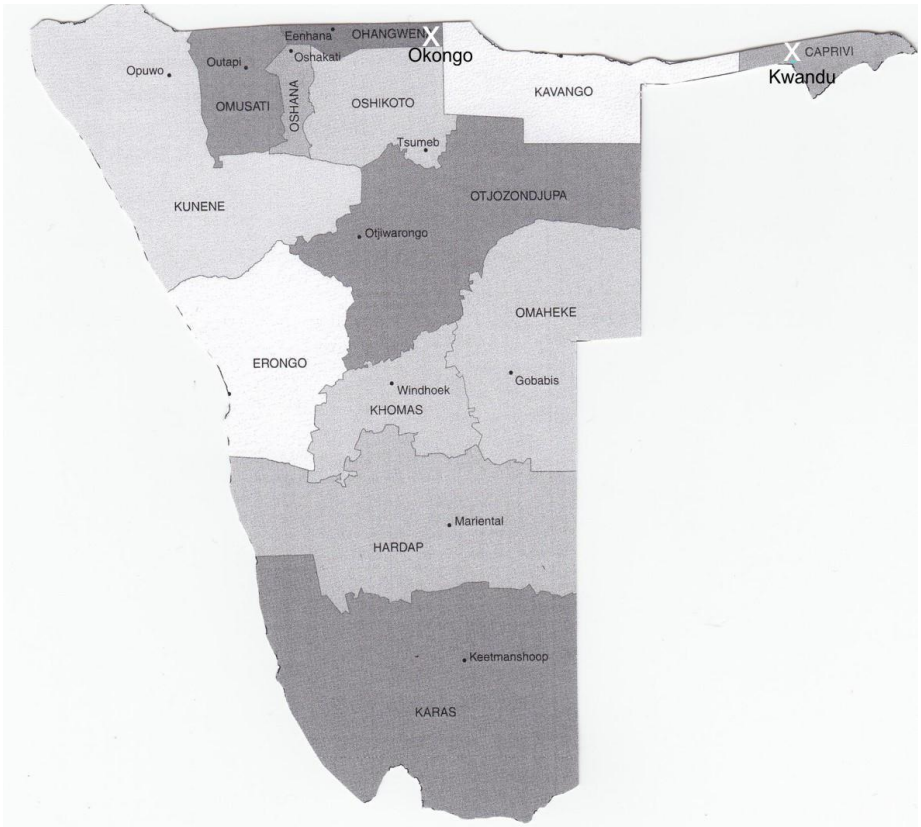


Figure 2.1 Locations of Okongo Community Forest in the Ohangwena region and Kwandu Community Forest in the Caprivi region in Namibia (Mendelsohn et al. 2003).

high mortality of AIDS has been associated with the leading cause of death since 1996 in Namibia (UNDP 2007)[10]. Factors which contribute to the high HIV/AIDS prevalence are poverty, gender inequality, gender-based violence, high rates of sexually transmitted infection (STI), migration and lack of education. The high prevalence of HIV has considerable socio-economic implications including: loss of income, increasing health and funeral expenditures, low productivity of the affected and infected working population, and an increasing number of orphaned children. Namibia has special programmes for HIV/AIDS control e.g. in 2004–2009 it implemented the Third Medium-Term Plan (MTP III).

10 The infant mortality rate was 46 per 1 000 live births in the Second National Development Plan (2001–2006). The life expectancy at birth in 2001 was 49 years.

2.1 POVERTY DEFINITIONS

United Nations has defined poverty to be a lack of funds, basic services, education and participation in political, cultural and social decision making. Poverty is also linked to famine and health problems. The poor are those whose resources are limited. According to the European Union (EU) (1989) a poor person's resources (material, cultural and social) are so limited that they prevent participation in the way of living, that is the norm for their country. According to Sen (1992), in order to aggregate poverty one has to specify a person's minimum needs and his ability to meet them. If these needs are not fulfilled, a person has constraints in the community and cannot act as he wishes. Ravallion (1995) has defined poverty that one cannot afford certain determined consumption needs. Moreover, the poverty line describes the living conditions of the poor and determines their minimum level (Ravallion 1998). Dhongde and Minoui (2010) state that the poverty line reflects the minimum costs required in fulfilling the basic needs of an individual. According to the two poverty profiles of Ohangwena and Caprivi Regions (NPC 2004c; 2006a) poverty implies an inability to afford the minimum basic necessities, is characterized by a lack of necessary capabilities to perform optionally in society and is often interlinked to perturbations in climate change (natural disasters) and as a result of globalization (economy) measures.

Namibia's poverty estimates are not based on the proportion of people living on less than a 1.25 US dollar a day[11] (NPC 2008a). Until recently, Namibia's official poverty figures have been defined in monetary terms, and was based on household expenditure which used the **Proportion of the Total Household Expenditure on Food;** 1) The 'Poor' were those who spent 60–80 per cent of their total expenditure on food. According to this definition, in 2003/2004 as much as 27.4 per cent of people were poor in Namibia. 2) The 'Extreme poor' were those who spent 80 per cent or more of their total expenditure on food, i.e. 3.9 per cent of population of Namibia.

At the moment, Namibia is implementing the **Cost of Basic Needs Approach** for its poverty definitions. The monthly Namibian dollar (N$) per capita values are based on the Namibia Household Income and Expenditure Survey (NHIES) 2003/2004. The values of national poverty lines are the following: 'food poverty' is N$127.15, 'lower bound poverty' (severely poor) N$184.56 and 'upper bound poverty' (poor) N$262.45 (NPC 2008b). According to this method 27.6 per cent of the people are poor, which is nearly the same figure as that based on the proportion of the 'total household expenditure on food' method. The distinction is significant

11 International poverty line (World Bank, 2008).

in the severely poor group; the amount of severely poor people increases to, 13.8 per cent (a quadrupling) using this method.

According to the 2001 Census, the mean household size in Okongo was 6.4 people (NPC 2005). When this figure is multiplied by the national lower and upper poverty line figures (NPC 2008b) the Okongo household level poverty line figures are obtained. The expenditure frame for a poor household in Okongo is N$1 181.2 – N$1 679.7 per month. In Kwandu the mean household size was 4.8 (NPC 2003) and the expenditure frame for a poor household is N$885.9–N$1 259.7 per month. These calculated household level poverty frames were also used when classifying the households into the poverty groups.

Poverty in Namibia is a multi-dimensional phenomenon. The Human Poverty Index (HPI) and Human Development Index (HDI) can be used to measure poverty at national and sub-national levels. The HPI also allows the calculation of the degree of deprivation in three dimensions of human life: longevity, knowledge and standard of living. In Namibia it also has included the degree of extreme poverty in the region measured by the proportion of the population who spend 80 per cent or more of their income on food. The mean HPI was 26 per cent in 2001–2004 (range: 19 to 45). In 2009 the HPI-value[12] was 17.1 per cent[13]. The Namibian HDI[14] is presented in Table 2.1. It includes life expectancy, literacy and educational attainment rates. The Table also presents GDP per capita within the second National Development Plan (NDP2) in 2001–2006 and in 2009 (NPC 2008a). The HDI has increased up to the year 2009 due to the significant improvement of life expectancy as a result of the better HIV/AIDS situation in the country.

Table 2.1 HDI and GDP per capita in Namibia for 2001–2006 period and for 2009.

Namibia	**2001–2006**	**2009**
HDI	0.650	0.686
-life expectancy, years	49	52.2
-adult literacy rate, %	83.9	88.0
-primary enrolment, %	92	67.2 (combined)
GDP, US$	4 135	5 155

The Ohangwena and Caprivi poverty profiles (NPC 2004c; 2006a), were elaborated on the basis of the regional participatory poverty assessments and poverty forums. These profiles give the basic information on poverty in these two regions. This is

12 The proportion of the population not likely to survive up to 40 years of age was 21.2 per cent, the proportion of illiterate was 12 per cent, and people living at levels below the proper living standards as defined by being underweight was 24 per cent, whereas people without access to safe water and to health facilities was 7 per cent.

13 A higher value indicates a higher level of poverty.

14 A higher value indicates a higher level of development.

in accordance with that detailed by Ravallion (1998) who has described a poverty profile as 'a decomposition of poverty measures of a region's population sub-groups'. In Ohangwena and Caprivi the San people[15] belong to the **extremely poor** (NPC 2004c; 2006a). The group copes with begging, working for the better-off, collecting, by selling natural resource products and by receiving charity. The San have access to land but they do not have any equipment to work it with. They may own a few goats and rarely some chickens. The group experiences food shortages for the greater part of the year. The group also spends a major part of its income on food, little or nothing on education, clothing and health care but a large portion on alcohol or drugs. Their birth rates are high and their sanitation and health are poor. The San are powerless and they do not inherit anything besides poverty.

The Ohangwena and Caprivi poverty profiles also show that one third of households are **poor** and some of them have inherited poverty. The poor in these communities struggle to survive and are vulnerable to extreme poverty. Households are often food insecure. People can afford only one or two meals per day and they do not have enough water for human and animal consumption. In rural areas the poor are mostly subsistence farmers and casual labourers who have limited production and household assets and depend on pensions, craft sales, and casual labour such as building houses and animal enclosures. They own only a few head of cattle, some chickens and a small number of goats, which they use for milk, meat or sell. The collection and sale of wild fruits, grass, reeds, firewood, home brew and fish are important, and commercial sex is also widely practiced by the poor. In very difficult times the poor depend on wild fruit and forest products for survival, they borrow from neighbours and hire out their labour cheaply. The poor do not have access to capital and they lack funds for proper healthcare and education for their children.

The Ohangwena and Caprivi poverty profiles record that poor people, especially the San group and the HIV/AIDS infected are often excluded from community decision-making processes. The poor can fall deeper into poverty when natural disasters, livestock diseases, loss of productive assets or unemployment occur. The starts of alcohol abuse, outbreak of illness or HIV/AIDS, orphanage or poor education can accelerate moving down in society. Gender also plays a role in poverty in the rural areas of Namibia. The inheritance traditions are not fair to women, their rights are also weak.

According to the Ohangwena and Caprivi poverty profiles (NPC 2004c; 2006a), the **rural poor** depend on neighbours for loans of farming implements, draught power and cash income. They are generally unable to educate their children and to pay for health services. They also lack staple foods at times throughout the year. The slightly less poor cope through work for others and manage to pay for their

15 Traditionally a group of hunter gatherers in Southern Africa.

school fees and health services. They also suffer from alcohol and drug abuse. The moderately poor have some cattle, goats and chickens. They can plough their fields in time to get a harvest and they can afford to pay for health services and school fees. The **urban poor** differ from their rural counterparts. They do not rely on natural resources but depend on begging, crime, commercial sex and relatives. This makes them vulnerable to abuse and the risk of HIV/AIDS.

In Ohangwena and Caprivi poverty profiles a state of **well-being** is defined as having enough food to feed one's family, having adequate housing, being able to educate one's children, being able to pay for health services for sick family members, and have reasonable access to social services. For farming families well-being also means having a reasonable number of livestock, adequate grazing areas, fruit trees and other assets to sustain their livelihood. According to the Ohangwena and Caprivi poverty profiles (NPC 2004c; 2006a), good governance and knowledge about the Government's structure and processes are crucial in poverty alleviation. Good education, skills, access to capital, resources and assets are the most important ways out of poverty.

It is also important to recognize the concept of **vulnerability**, because people can first turn into being chronically vulnerable and then fall into poverty. The concept of vulnerability is the one that is applied in the Orphans and Vulnerable Children (OVC) Toolkit (2005) of the World Bank[16]. In Namibia the San people, who are regarded partially as nomadic hunter-gathers, and who do not have productive resources and livestock of their own, belong to the most vulnerable group. In general households that have lost a breadwinner, live with disabilities or have prolonged disease or are female-headed are more susceptible to poverty.

For comparison, the rural **slightly rich** cope through cultivating crops, rearing cattle (even 100–200 head of cattle) and have some employment, and have access to natural resources. They have implements to plough their fields or can hire a tractor for cultivating, and may employ poor people to work in their fields. The rural **rich** are employed and usually have full-time jobs and considerable salaries. They are able to buy and sell cattle and own between 300 to 500 head of cattle. Their crop fields are large and they have their own tractors for ploughing, and they hire other villagers to work for them. The rich do not use much of the natural resources for their day-to-day living. (NPC 2004c; 2006a).

16 'Vulnerability is a high probability of a negative outcome or an expected welfare loss above a socially accepted norm, which results from risky/uncertain events and the lack of appropriate risk management instruments. Vulnerability is a relative state – a multifaceted continuum between resilience and absolute helplessness'.

2.2 POVERTY REDUCTION

The main foundation of Namibia's poverty is based on previous racial segregation, the unequal development of ethnic and social different groups, which is deepened by the prevalence of HIV/AIDS and regional, economic and climatic conditions. The Ohangwena and Caprivi poverty profiles suggest that education and economic growth could be the quickest and best ways out of the poverty. This would need clear targets and long-term cooperation between all stakeholders based on the basic regional information and conditions.

Poverty is a complex multifarious issue. Food and nutrition, gender, agriculture, drought, education and health policies all have positive or negative effects on poverty reduction (NPC 2004a) and they all consider poverty reduction an important part of their aims and activities. Many government and non-government institutions in Namibia[17] collect poverty-related information through surveys or as a part of their management information systems. However, the regions might be different and the poverty alleviation measures need to be differentiated, according to the region and its circumstances.

Namibia has four programmes/strategies to promote poverty alleviation, which complement each other: 1) Poverty Reduction Strategy (PRS), which was approved together with a comprehensive Action Programme by the Cabinet in 1998. The PRS focuses on the equitable and efficient delivery of public services, expansion of agricultural production and strengthening of food security and the non-agricultural sector. 2) National Poverty Reduction Action Programme (NPRAP) identifies the priority actions to be taken in poverty reduction; development and maintenance. Such actions include the following: Namibia to be a transport and manufacturing hub within the Southern African Region, promote investment in education, investment in income generating capacities, promotion of a healthy and sustainable population, protection of vulnerable citizens and an increased efficiency of utilization of resources. 3) Poverty Monitoring Strategy (PMSY) is developed to ensure that information on poverty is collected, analysed and disseminated on a regular basis (NPC 2004a) and 4) the use of Poverty Monitoring System (PMS) indicators that assess progress referred to above.

When reducing poverty, the real experts on poverty are the poor themselves. They know and have experienced what it is to live in poverty, they know some of the causes and consequences of poverty, and they might have ideas how to get out of poverty. A tool, which clarifies the situation at the grass roots level by collecting the poverty information from the poor themselves, is the Participatory Poverty

17 National Planning Commission Secretariat, Ministry of Finance, Office of the Prime Minister, other line ministries, Regional Councils, Monitoring and Evaluation units of programmes and projects, NGOs, development partners and communities.

Assessment (PPA). It complements the information of Censuses and Households Surveys (CHS), which estimate trends in poverty. The last NHIES was conducted in 2003/2004. The extent to which growth favours the rural sector is often the key to its impact on aggregate poverty (Ravallion 2007).

In the Participatory Poverty Assessment (PPA) poverty is defined and analysed from the perspective of the poor themselves (NPC 2005). The National Planning Commission Secretariat (NPCS) facilitated the PPAs and the formulation of Regional Poverty Profiles (RPP) in all 13 administrative regions of Namibia in 2003–2006.[18] The poverty profiles can be used for determining regional poverty indicators and poverty reduction programmes, which can be linked to the Regional Development Plan (RDP). Each region must have its own poverty alleviation measures, because the dynamics and types of poverty vary between different regions. The findings of PPAs in Namibia show that the major problems for the poor are; HIV/AIDS, unemployment, lack of or inadequate access to social services, the poor quality of social services, the lack of or inadequate amount of assets such as livestock and arable land for cultivation, and a poor road infrastructure (NPC 2008a).

Better access to education is crucial for enhancing employment in the non-farm sector. According to Jogo and Hassan (2010), government policies that enhance access to education enable the poor to diversify into non-farm livelihood sources. McDermott (2009) noted that community forestry reduces poverty only when it adopts a goal to get the benefits. The poor can get benefits better when participating in the decision making processes. The poor households are more dependent on non-timber forest products (NTFPs), which make an important contribution to rural livelihood through the use and sale of products (Paumgarter et al. 2009).

In this study, the conclusions of poverty changes in Okongo and Kwandu communities were based on the information of household surveys, community bookkeeping records and cost–benefit analyses. The two household surveys are explained and analysed in the sixth chapter of this study entitled 'Data'. The original plan was to repeat identical Okongo and Kwandu Household Surveys at the end of 2009 to measure the poverty change. The repetition did not materialize at the present stage. However, such a repetition would give exact comparative information on poverty changes. Ravallion and Chen (2007) noted that when using household surveys, time periods and definitions must match poverty alleviation measures, and growth must be measured in household revenue or per capita consumption. According to Ravallion and Chen (2007) one should be aware of the survey design (sampling or questionnaire design). The two surveys at different dates should be directly comparable in order to dedect change over time.

18 Namibia's first PPA was undertaken in the Ohangwena Region in 2003, and its results were validated and discussed in the Ohangwena Poverty Forum in 2004.

3. RURAL INDUSTRIES AND LIVELIHOODS IN NAMIBIA

The purpose of this chapter is to describe the main rural industries: forestry, agriculture, wildlife and eco-tourism that exist in Northern Namibia, and to give an overall picture of rural industries in Okongo and Kwandu regions. The emphases are on community forestry as part of forestry, on subsistence agriculture as part of agriculture i.e. small-scale cereal production and livestock farming in open grazing. Tourism is emphasized in wildlife conservancy and in community-based tourism. The chapter also includes a description of the REDD-plus, which (or another PES-tool) might be a new tool for sustainable community forestry under a climate change setting.

In communal areas the same land area might be used for more than one purpose, e.g. the forest area is used for firewood collection and also for hunting. This kind of overlapping, or joint use, varies according to the rural industry and the technique being used, the available land, climatic and geographical conditions in the area. Traditional practices and customs of the local land-uses give a background against which sustainability for this kind of aggregate land use.

3.1 FORESTRY

Namibia is a dry country but due to its large size it has different vegetation areas, which also include forests. Namibia's natural broad-leafed forests and woodlands are located in the northern and north-eastern parts of the country, and almost no planted forests exist. In Namibia woodlands cover about 20 per cent of land, whereas savannahs account for 64 per cent of the land (Erkkilä and Siiskonen 1992)[19]. As to the ownership of forests, Namibian forests are classified into three categories: state forest reserves, regional forest reserves, and community forests/ forest management areas (NPC 2006). Namibia's climatic and biophysical conditions i.e. dryness and poor soils make forestry, particularly silviculture, more difficult. Namibia does not have a forest industry as generally understood. Forestry is mostly for conservation, biodiversity and multiple uses of forests. However, some wood trade is practised by

19 About 25 per cent of forests can be classified as open forests when using the International Panel on Climate Change (IPCC) definition (IPCC 1997; NPC 2002).

the Government and communities by selling harvesting permits for concessions.[20] Moreover, some small-scale sawing is practised.

In the near future the REDD-plus and/or the PES-tools might draw some additional attention to the forests in Namibia. The country is already quite ready for current environmental tools, which could help in sustaining the fragile forests. Conservancies and community forests in Namibia have secure rights over their natural resources. The REDD-plus- or PES-payments could be channelled through a Trust Fund to community forests and conservancies, which are legal entities and can enter into contracts with others (Jones and Barnes 2009).

3.1.1 FOREST RESOURCES

The completion of the national forest inventory in 2004 enabled the development of the preliminary forest resource accounts in Namibia (Table 3.1). In 2004 the total woody standing stock was 256.8 million m^3 (NPC 2008a).[21]

Table 3.1 Forests of Namibia, Ohangwena and Caprivi Regions, and Okongo and Kwandu Community Forests in 2004.

	Namibia	Ohangwena	Caprivi	Okongo	Kwandu
Total area	82 411 600	1 070 300	1 452 800	76 758	19 936
Households	346 455	35 958	16 839	229	210
Population	1 830 330	228 384	79 826	1 000	699
Total wooded area	15 580 000	n/a	n/a	55 918	19 888
Production forest area	8 346 730	n/a	n/a	42 357	11 575
m^3/ha in production forest area	31.18	20.00	21.37	43.2	23.1
Total volume, m^3	256 861 237	21 388 000	30 915 979	2 400 000	459 604
Community forest area, ha	394 721	56 500	65 874	55 918	19 888

When the Forest Accounts were published, the economic importance of Namibian forests was recognized for the first time. The value of current forest use in terms of gross output was some N$1.2 billion, making a direct value added contribution to the Gross National Product (GNP) of Namibia of N$1 billion, about 3 per cent of GNP in 2004 (Barnes et al. 2005).[22] The total direct and indirect economic impact of the forest use sector on the broader economy was estimated at N$1.8 billion.

20 Marked logging areas to small companies or to private people.

21 The most common species are *Acacia terminalia*, *Baikiaea plurijuga* (Zambian Teak), *Pterocarpus angolensis* (Kiaat, blood wood), *Burkea africana*, *Colophospermum mopane* (Mopane), and *Combretum species*.

22 In 2004 the share of agriculture was 4.6 per cent, fishing 5 per cent, mining 6.8 per cent, and tourism 6 per cent of the GNP.

However, economic factors such as remoteness, access, market size and size of rural population may preclude these yields. Namibia's standing forest assets (the natural capital stock) were estimated to have a value of N$19 billion[23] (Barnes et al. 2005). Standing forest assets and forest sector's National Gross Output (NGOF) in 2004 are presented in Table 3.2 (NPC 2008a).

Table 3.2 Namibia's standing assets and National Gross Output for forests in 2004, N$. (Euro1 = N$10).

Namibia	Standing forest assets, N$, million	Forest sector's Gross National Output, N$, million
Fuel wood	10 200	648.3
Poles	2 000	176.7
Saw timber	634	0
Non-timber forest products	5 900	415.7
Total	18 734	1 240.7

The forest accounts did not include the use of woodlands and savannahs for livestock grazing or data on their wild fauna. Apart from basic saw-milling, the forest accounts also did not include the processing of forest products. The use of forest products in building, furniture and craft production was also excluded. In Namibian forestry rent capture was largely limited to the Directorate of Forestry's and gazetted community forests' collection of license fees (Barnes et al. 2005).

At the time of writing this study live trees are not harvested for furniture timber in Namibia, because the valuable species were severely depleted between the 1950s and 1980s. One hundred years ago, the extensive felling of trees in Ohangwena was reported and in 1962 the Odendaal Comission[24] considered deforestation to be one of the greatest economic and environmental problems in the area (Erkkilä and Siiskonen 1992; Erkkilä 2001). Harvests increased substantially after World War II as a result of rising demand for timber in the northern regions; including Okongo and Kwandu (Mendelsohn and el Obeid 2005). The peak years for logging were between 1960–1970. In 1990–1995, the annual rate of deforestation was 0.3 per cent (FAO 1997; Erkkilä 2001). In 2003 the Government stopped timber exports to take stock of its timber resources and to ensure that resources would remain in community forestry (Mendelsohn and el Obeid 2005). Harvested fuel wood and poles are mostly destined for home consumption in rural households but a small proportion are for limited sales in urban areas.[25] Per capita consumption of fuel wood and charcoal tends to decrease as incomes increase (Angelsen et al. 2009).

23 Estimated in terms of the resource rent that could be generated over the next 30 years and using the Net Present Value Method and 6 per cent discount rate.

24 "Commission of Enquiry into South-West Africa Affairs", appointed by the South African government.

25 Each year about 100 000 m^3 of firewood and 48 000 m^3 of charcoal in Nambia is sold (Mendelsohn et al. 2006).

3.1.2 COMMUNITY FORESTRY

Globally, poverty is associated with lower compliance with Natural Resource Management (NRM). At the community level the need for addressing NRM collectively is critical and land tenure has a significant impact on the opportunity to enact the NRM bylaws (Nkonya et al. 2008). Sustainable and participatory forest management is one way to reduce poverty, improve rural livelihood, enhance socio-economic development and ensure environmental stability.

Namibia's long-term development plan, 'Vision 2030', emphasizes sustainable development and acknowledges secure tenure over natural resources. Forests are mainly used for home consumption in communal areas that is for firewood and construction materials. Until now the Government of Namibia has leased out harvesting and collection permits in its forest areas for commercial purposes, including leasing to outsiders. However, in the last 10-15 years the Government has increased the role of local communities in forestry and forest management although this has reduced the Government's own revenue sources. Forests have become one of the community development tools.

Namibia's communal forests cover some 7.5 million hectares (MAWF 2005). The Government is promotes community forestry where forest resources i.e. timber, fuel wood, building material, fruits, seeds, roots, traditional medicines and livestock grazing are managed by the communities themselves. The Forestry Strategic Plan (FSP) 1996 and the Forest Act 2001 give the basis for the community level forest management (MAWF 2005).[26] In the community level the community forests are managed in accordance with Forest Management Plans (FMPs) and Community Forest Guidelines. The responsibility of management, planning, implementation, internal control and reporting stays with the Forest Management Committees.

3.1.3 FORESTRY IN OKONGO AND KWANDU COMMUNITY FORESTS

When the Okongo Community Forest in Ohangwena and the Kwandu Community Forests in Caprivi are compared, it can be seen that Okongo is two thirds larger in size (Table 3.3).

26 The declaration of a community forest needs: 1) specified geographical boundaries, 2) the consent of the Traditional Authority, 3) a management plan, 4) the appointment of a body responsible for managing the community forest in accordance with a management plan, 5) approval of the Ministry of Lands and Communal Land Boards, 6) description of how members' have an equal use of forest and access to forest products, and 7) a description of how forest management is financed, and how potential surplus benefits will be distributed and equal access ensured.

Table 3.3 Okongo and Kwandu Community Forests in 2004.

Community Forests	Okongo	Kwandu
Forest hectares, ha	55 918 (production forest 42 357 ha)	19 888 (production forest 11 575 ha)
Community members	1 000	699
Households, n	229	210
Live tree volume, m^3/ha	43.2	23.1
Live tree volume, m^3	2.4 million	459 604
Live trees stems/ha	210	100
Dead wood volume, m^3/ha	5.6	5.1
Dead wood volume, m^3	310 800	101 760
Dead wood stems/ha	26	17
Annual allowable cut, stems	62 940	21 219

In Ohangwena and Caprivi Regions, forestry has some potential in revenue generation. In 2004, Ohangwena had 8 per cent (21 million m^3) and Caprivi 12 per cent (31 million m^3) of Namibia's total woody standing stock (NPC 2008a). Both regions are regarded as forestry regions due to the availability of valuable tree species and due to the old traditions of wooden constructions of *inter alia* huts and fences. In Caprivi in particular there exists a tradition of wood carving and crafts production that matches well with tourism. The study expects that the community members use only their community forest area for their daily forest use.

The total area of **Okongo Community Forest** is 75 518 hectares, which consists of two areas of 55 918 hectares for community forest (from where the forestry benefits are derived) and 19 600 hectares[27] for wildlife development. The Okongo Community Forest is a part of the Southern African Baikiaea plurijuga (Zambezi teak) woodland ecosystem and most of the forest area has deep Kalahari sand. In 2003 about 1 000 people lived in 20 settlements which were either inside or adjacent to the community forest (Mulofwa et al. 2003). In 2007 there were 229 households in the same area[28] as reported by the Social Impact Assessment and Policy Analysis Corporation (SIAPAC) 2007a; Mulofwa 2010 personal communication).

According to the FAO classification, 76 per cent of the Okongo Community Forest area is classified as forest i.e. 42 498 ha, and only 5 per cent of the area does not have any woody vegetation. The sustained yield estimation of the forest is based on diameter growth and the change in trees to larger size diameter classes when the structure of the forest is unchanged (Mulofwa et al. 2003). The total live tree volume is 43.2 m^3/ha[29] and consists of 29 tree species. Volumes and numbers of stems are high in Namibian conditions; almost a half of the Okongo Community Forest

27 A former quarantine camp.

28 206 households were Ovakwanyama and 23 were San.

29 In total 2.4 million m^3 and 210 stems/ha.

has a high tree volume. The total harvesting potential is 62 940 stems[30] annually (Angombe et al. 2000). The most common tree species are presented (Table 3.4). Other species, which can be found in Okongo are *Burkea africana*, *Combretum collinum* and *Terminalia sericea*. The total deadwood volume is considerable 5.6 m^3/ha[31] and the dead trees are quite small in size.

Table 3.4 Most common tree species in Okongo Community Forest in 2004.

Okongo tree species	m^3/ha	Total m^3	Saw timber %
Baikiaea plurijuga; Zambezi Teak	1.2	67 100	15
Pterocarpus angolensis	0.86	48 100	30 (good quality)

Grass covers 25 per cent of the ground in almost the whole community forest area and a substantial part of the community forest (10 625 ha, 19 per cent) is utilized for grazing. Fuel wood harvesting in Okongo is limited to the dead trees of the main timber tree species.[32] The total fuel wood consumption in Okongo is 42 tons per year as measured in 2003. The pole collection is also obtained from dead trees.[33] Houses are constructed or renovated in Okongo every fourth year.[34] [35]

In the Okongo Community Forest there are 16 types of fruit trees[36] and there are also four edible worms and four species of honey bees. Annual and perennial grass species of thatch grasses grow in nearly half of the area (41 per cent, 22 926 ha) with coverage of 30 per cent. Annually about 104 tons of thatch grass is used for construction in the community forest area.[37] The Community Forest has also tried some new income generating activities e.g. domestication of Guinea fowl. (Mulofwa et al. 2003.)

In Okongo Community Forest there are some problems caused by uncontrolled grazing by outsiders, illegal fencing to convert forest into farmland, uncontrolled harvest of fruits, man-made forest fires and cutting of living trees for poles and firewood of which the most damage (95 per cent) is caused by fires.

30 About 7 553 m^3 if the mean size of a tree is 0.12m^3.

31 In total 310 800 m^3 and 26 stems/ha.

32 A household collects one 10 kg fuel wood bundle per day.

33 An average household requires 1 400 poles for a courtyard, 2 200 poles for fencing and (kraal) 600 poles for a fenced livestock area (kraal).

34 One household needs about 1 000 poles for renovation and construction, and thus the annual need in Okongo Community Forest is 29 000 poles for 29 houses.

35 The preferred species in construction are; *Terminalia sericea*, *Combretum collinum*, *Burkea africana*, *Baikiaea plurijuga*, *Croton gratissimus* and *Dicrostachys cinera*.

36 *Schinziophyton rautanenii* (Omanghete) is used for brewing ovambo gin (Ombike) and for making oil, and *Strychnose cocculoides* (Omauni) fruits are eaten unprocessed.

37 A small hut needs a mean of 25 bundles and a large hut 30 bundles of thatch grass. An average weight of a bundle is 10 kilograms.

The total area of the **Kwandu Community Forest and Conservancy**, where community forest and conservancy activities share the same area, is 19 888 ha and the forestry benefits are derived from about a half of the area. Kwandu consists of 210 households and 699 people (Diggle 2008; personal communication). The Conservancy was declared in 1999 and since then the local community has managed its wildlife resources. In Kwandu the Community Forest and Conservancy have a common Management Committee; the same people are employed by the community to work for community forest and conservancy. The Kwandu area comprises Burkea-Baikiaea woodlands where live tree volume is 23.1 m^3/ha and the trees belong mostly to small and medium sized diameter classes[38]. The four most common species represent 83 per cent of the total live tree volume (Table 3.5).

Table 3.5 Four most common tree species in Kwandu in 2004.

Kwandu tree species	%	m^3/ha	Total m^3	Stems/ha
Baikaea plurijuga	63	14.5	289 037	19.2
Combretum collinum	12	2.8	55 515	25.4
Burkea Africana	4	1.0	19 205	2.6
Lonchocarpus nelsii	4	0.9	16 905	10.8

No one is allowed to harvest live trees for carving in Kwandu. The mean dead tree quantity is 5.1 m^3/ha and dead trees are used for firewood and crafts.[39] The diameter distribution in the Kwandu Community Forest is planned to be constant in the coming years and the structure of the forest will remain the same. Harvesting will be done only in the three smallest diameter classes for the number of big trees is not adequate at the moment. The total annual harvesting potential is 21 219 stems. The Kwandu Community would like to harvest only 50 per cent of annual allowable cut, some 10 600 stems[40], due to the limited workforce, market availability and transport (Kamwi 2003.).

The objectives of the Kwandu Community in their forest management activities are to utilize woody and non-woody forest resources, conserve biodiversity, graze livestock, maintain forest cover for wildlife, conserve medicinal plants, control forest fires and protect cultural sites. The Kwandu Community practises seasonal grazing to maintain the grazing resources. The domestic livestock are restricted around the settlements during the rainy season in order to protect crop fields. Livestock are grazed in the forest area from October to March. The main causes of damage in

38 In total 459 604 m^3.

39 In total 101 760 m^3 and 17 stems/ha, and consists mostly of *Baikiaea plurijuga* (3.5 m^3/ha, in total 69 518 m^3).

40 About 2 546m^3 if the size of a tree is 0.12m^3.

Kwandu Community Forest are fire, people and mammals (Kamwi 2003). Wildlife damages amount to about 20 per cent of the total damages (Otsub et al. 2004).

In Kwandu each household uses 48 big (25 kg) bundles of firewood annually, making a total of 1 200 kg. Some of the firewood is collected outside the forest area i.e. from the field areas. Medium-sized (diameter of 10–15 cm) poles are preferred for hut construction and home courtyard fencing.[41] Rafters will only be harvested in densely forested areas.[42] All poles[43] are not extracted from the forest alone but also from woodlands around homes.[44] Some fruits[45] are collected in Kwandu in addition to medicinal plants[46]. The thatch grass is collected for domestic and commercial purposes; only non-community residents need permits for collection (Otsub et al. 2004).[47]

3.2 AGRICULTURE

Agriculture (excluding forestry) occupies 64 million hectares, 78 per cent of Namibia's land area, and includes 206 000 households and 1.17 million people. Over 60 per cent of the population in Namibia practise some form of agriculture for their livelihood. However, less than 2 per cent of the total land area is arable because of the limiting rainfall (NPC 2002), only 40 000 hectares are suitable for the intensive agriculture and the country has drought six out of every 10 years (Mendelsohn et al. 2006).

Namibian farms can be divided into freehold and communal farms. Some 4 500 commercial farmers with a freehold title occupy more than a half of the agricultural land. Their farm size rangers between 3 000 to 20 000 hectares and farming is characterised by extensive livestock ranching. These farms employ about 35 000 agricultural workers. The communal sub-sector has a total area of almost 6 million hectares which consists of 150 000 small-scale subsistence farmers who farm under the traditional land tenure regimes (NPC 2003). In 2004 communal areas accounted for 24 per cent of the total agricultural production (Mendelsohn et al. 2006).

---

41 Species: *Cobretum collinum*, *Baikiaea plurijug*a, *Terminalia sericea*, *Dichrostachys cinerea* and *Burkea africana*.

42 Annually 28 big houses are constructed in Kwandu, each of which needs 200 poles, and 29 small houses are also constructed, each of which needs 80 poles. Ten big houses are renovated yearly, which need 100 poles each and 10 small houses, which need 40 poles each. In total 30 600 poles annually for fences.

43 The preferred species are *Terminalia sericea*, *Combretum collinum*, *Burkea africana* and *Dichrostachys cinerea*.

44 In 2003 the price of a small sized pole was N$1.50 and a large size pole N$3.00 (Otsub et al. 2004).

45 *Berchenia discolor* (bird plum) and *Srychnos punges* (monkey orange)

46 *Harpagophytum procumbens* (Devil's claw) and *Croton gratissmus* (lavender croton)

47 In Kwandu, the construction of a small house needs 30 bundles and a large house 150 bundles of thatch grass. Mean weight of a bundle is 10 kg, and in 2003 the value was N$5 per bundle.

The NDP3 goal strategies in the agricultural sector for years 2007/2008–2011/2012 are the following: 1) manage soil erosion and nutrient depletion through enabling policies and legislation, 2) promote the use of soil fertility enhancement technologies, 3) promote the utilisation and commercialisation of indigenous plant resources, 4) ensure sound animal surveillance through regular livestock inspections, 5) facilitate community and stakeholder involvement in the sustainable management and utilisation of forest resources, and 6) promote the formulation and implementation of conservancy management plans (NPC 2008a).

According to the FAO classification[48] Namibia has five major farm production systems (Table 3.6) including: small-scale cereals and livestock production, small stock production, mixed cattle ranching, intensive agriculture and natural resource production (Mendelsohn et al. 2006). Small-scale cereals and livestock production is dominant in communal areas in Northern Namibia including small exclusive farms and open grazing. The main commodities are millet (mahangu), sorghum, maize, goats and cattle. Inputs are low and markets are local. In natural resource-production the main commodities are indigenous fauna and flora and landscape, including conservancies, game farms, community forests, parks and reserves. Inputs are moderate and the production is for commercial sales, mainly for export. The natural resource production occupies about 5.5 million hectares and it mainly uses the same area as the small-scale cereals and livestock production.

48 A farming system is defined as, a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate.

Table 3.6 Farming systems in Namibia in 2006.

Farming system	Ha, million	People involved	Cattle	Goats	Sheep	Production	Land tenure
Small-scale cereals and livestock production	5.5	960 000	600 000	950 000		home consumption	usage rights
Small stock production	27	67 000	180 000	650 000	1 200 000	commercial sales	exclusive ownership
Cattle ranching	31.5	106 000	1 400 000	800 000	300 000	commercial sales	exclusive ownership
Intensive agriculture	0.04	40 000				commercial sales	exclusive ownership, lease
Natural resource production	(5.5)	(960 000)				commercial sales	exclusive ownership or usage rights
Total	64	1 173 000	2 180 000	2 400 000	1 500 000		

Prior to Independence (1990) communal area people were forced to live in communal areas and their farms were too small to allow them to make a decent living or improve their living conditions. Moreover, education, health, water, veterinary and other services were supplied to a minimal degree (Mendelsohn et al. 2006). Everyone used common areas outside the fields. Non-farming revenues were important. Nowadays sources from non-farming activities such as wages, pensions and remittances from family members are still important in the north-central communal areas.

In principle the implementation of the communal land reform act (Act No 5, 2002) provides a unified legal system for all communal areas. The local control of land is in the hands of traditional leaders who allocate residential, cultivation, grazing and gathering rights to people. Land Boards approve those customary and leasehold rights (NPC 2008a). However, communal area farmers do not have a permanent or legal tenure over the land allocated to them and therefore have little access to bank loans. Poverty alleviation and increased agricultural production still remains as major challenges for the Namibian land reform. The size of communal area fields is often limited due to the availability of labour, since most work is done manually. Larger areas are planted only in good seasons when the rains start early (Mendelsohn et al. 2006).[49] Goats, cattle, some poultry, a few pigs and donkeys and a very low number of sheep dominate the communal area livestock production systems. In 2006 there were 35 000 farming households in Ohangwena Region compared with 12 000 in the Caprivi Region.

49 Fields belonging to wealthy households can extend from 5 to 10 hectares, whereas the poorest farmers usually have less than 1 hectare.

The National Agricultural Credit Programme pays communal area farmers credits and subsidies.[50] [51] The northern communal area also receives subsidies for livestock vaccinations and for construction of pipelines, boreholes, pumps and water troughs. The Ministry of Agriculture, Water and Forestry distributes advisory and training services through its Extension Offices and Agricultural Development and Veterinary Extension Centres.

3.2.1 AGRICULTURAL PRODUCTION

The share of cattle and small stock production was almost 90 per cent of the agricultural sector (NPC 2002). In 2004, the whole agricultural sector including processing made up 5 per cent of GDP, equivalent to N$1 878 million. During the implementation of the Second National Development Plan (NDP2) in 2001–2006, the growth in agricultural and forestry sector was 2.2 per cent per annum. The mean overall economic growth in that period was 4.7 per cent per annum.

Markets in Namibia are small due to the low population. Most farms are also located far from markets or export destinations, and prices of farm produce have also to cover the transport costs to market. The only lucrative but small markets are in the urban areas. Agricultural exports in 2005 amounted to 6.9 per cent of total exports, N$1.1 billion of which livestock was 67 per cent. The marketing and processing of farm products in Namibia are provided by state-owned companies. The Meat Corporation of Namibia (Meatco), which also has abattoirs in the northern communal area is one such body. Trade in livestock and meat products is promoted by the Meat Board (MB) and the Namibia Stud Breeders (NSB). The Agronomy Board (AB) was established in 1985 and it focuses on horticultural crop production including: white maize, millet and wheat. The Namibia National Farmers Union (NNFU) and Namibia Agriculture Union (NAU) represent the interests of communal and freehold farmers.

3.2.2 CROP CULTIVATION

Agricultural production in Namibia is extremely sensitive to climatic conditions. Periodic droughts reduce grain production (NPC 2002). Droughts have become common in recent years (MET 2006). The mean annual rainfall in Namibia is about 270 mm (UNAM 2008). Evaporation is high and it affects the water availability.

50 In 2004 N$124.2 million for fencing, irrigation, equipment and draft animals.

51 Loans of N$30.5 million were given to 235 small-scale farmers to buy tractors for cultivation/tillage purposes (Mendelsohn et al. 2006).

In summer months the maximum mean temperature is over +30 C and in winter the minimum temperature is over +6 C. Pearl millet (mahangu) and maize are the most common crops but their production outputs do not meet local consumption requirements. Millet is vital to the food security for it is relatively drought resistant.[52] Dry land cropping is practiced in Ohangwena's mild sub-arid conditions. Caprivi's climate is subtropical (Table 3.7).

Table 3.7 Rainfall, length of cropping period and size of field in Ohangwena and Caprivi.

Region	Rainfall, mm	Cropping period, days	Field size, ha
Ohangwena	480–600	83	2.7
Caprivi	600–700	135	1.8
Namibia	270	n/a	n/a

In Ohangwena and Caprivi drought, pest infestations and the HIV/AIDS pandemic adversely affect agricultural production, and in Caprivi the floods also have a bad impact. Almost all farmers in Ohangwena plant millet and in Caprivi they plant maize. In Ohangwena about 80 per cent of farmers grow sorghum, mainly for beer production (Mendelsohn et al. 2006).

Fields are cleared, established and ploughed before the first rains. Poorer farmers hoe by hand whereas richer households use ploughs drawn by donkeys, oxen or even tractors. Only 4 per cent of all households use artificial fertilizers but 42 per cent use organic manure. This difference in practices is greater in Ohangwena than in Caprivi. Planting is done by hand, several seeds being planted into the same hole.[53] The seedlings are later thinned and fields are weeded once, twice or often three times during the growing season. Weeding is more frequent in Ohangwena than in Caprivi and it is the most time-consuming but important input in crop production. Millet, maize and sorghum are generally harvested four to five months after planting, usually between April and July. For crop production, 62 days are needed for one person per hectare when the work is done manually[54] compared with a minimum of 49 days when a tractor is used for ploughing (Mendelsohn et al. 2006).

52 In 2003–2005 the mean pearl millet production was 350 kg/ha, dry land maize 363 kg/ha, dry land cowpea 150 kg/ha and dry land Bambara nuts 250 kg/ha (NPC 2008a).

53 Approximately one half of farmers mix traditional and improved seeds in millet and sorghum cultivation.

54 Per hectare 13 days for manual hoeing (4 days using draft animal power or 2–3 hours using a tractor), 8 days for planting, 27 days for weeding, 7 days for harvesting and 7 days for threshing.

3.2.3 LIVESTOCK PRODUCTION

Beef and small stock (sheep and goats) production are the most common rural industries in Namibia, although game farming and mixed wildlife/livestock production are fast growing industries (NPC 2002). Namibian commercial farm beef is of high quality, all exports are certified as free of disease.[55] However, in communal areas the cattle sold to abattoirs are old and the meat is often of poor quality (Mendelsohn et al. 2006). The livestock production of commercial freehold farms is higher and more export oriented than that of communal areas.

Livestock farming is important in communal areas because of home consumption and sales, and also because of cultural traditions and financial security. Cattle are commonly exchanged, borrowed or pooled between family members.[56] However, more than a half of all households in the northern communal area do not have any cattle, pigs, sheep or donkeys, and two-fifths do not have goats. About one-third of households have neither cattle nor goats. The total off-take in Northern Namibia is about 11 per cent.[57] The reasons for the low off-take are irregular calving[58] and high losses due to mortality[59], lack of markets, shortage of labour, keeping cattle as capital asset, the need for oxen as draft animals and the need of cattle for milk, manure, and other production (Mendelsohn et al. 2006).[60] The majority of cattle are sold as weaners, most being exported to South Africa for fattening.[61] The use of animal husbandry practices (castration, dehorning and vaccinations) are on the increase.[62]

The constant over-stocking increases land degradation and the absence of good soils influence farming. In grass production each millimetre of rain results in the production of between 1.2 and 2.3 kilograms of grass fresh weight edible plant biomass per hectare, depending on soil fertility and degrees of bush density.[63] [64] Only minor infrastructure is available for cattle farming. Water is supplied from

55 The Meat Board has introduced the Farm Assured Namibian Meat Scheme (FAN Meat) as an additional method of guaranteeing meat quality. The scheme allows all meat products to be traced from the final market destination back to the farm of origin.

56 The 2004 Livestock Census reported roughly 1 165 430 animals to the north of the veterinary cordon fence in northern Namibia.

57 In 2007 the off-take of slaughter-ready animals through formal markets was 2.4 per cent (NPC 2008a).

58 Calving rates are seldom above 50 per cent and breeding is not controlled.

59 Mortality rates range from 10 to 20 per cent per year as a result of fodder shortages and diseases of livestock.

60 An mean of 16 000 head of cattle are slaughtered each year at the Meatco abattoirs in Oshakati and Katima Mulilo in Northern Namibia.

61 The composition of herds is controlled; cows make up 40 to 50 per cent, bullocks 20 to 40 per cent, calves 30 to 40 per cent and bulls between 1 and 2 per cent.

62 Cattle (95 per cent) are vaccinated on a regular basis by veterinary officials for foot-and-mouth disease, lung sickness and contagious bovine pleuropneumonia.

63 The production of livestock fodder (kilograms of edible plant biomass/ha) was 200 kg/ha in 2007.

64 In central Namibia 300 millimetres of rain produces grass to support 20 kilograms of live weight gain per hectare per annum, which equates to a 360 kg-cow needing about 18 hectares. With a price of N$7.50/kg, each hectare produces beef worth about N$150.

boreholes.[65] The grazing area is not fenced, and cattle are herded by young men or boys. The North-eastern communal area pastures burn down frequently. Bush encroachment as defined by the invasion and/or thickening of aggressive undesired woody species on pastures, is a serious problem for the Namibian livestock production sector. It affects 26 million hectares of woodland savannahs. In these natural pastures the carrying capacity can decline from 1 LSU per 10 ha to 1 LSU per 20–30 ha due to bush encroachment (de Klerk 2004).

3.3 WILDLIFE AND COMMUNITY BASED TOURISM

Community based tourism is an important part of the growing and developing tourism sector in Namibia. In eco-tourism, tourists pay to experience nature that is in harmony with the local culture and environment (Donnelly et al. 2011). The community conservancies have rights to use, develop and conserve their wildlife resources. Wildlife is also a part of eco-tourism and the communities' daily revenue generation. The conservancies can carry out trophy hunting, other forms of hunting (meat for own consumption), sale of live game, tourist lodge development such as joint ventures and campsite developments.

Tourism is one of the priority sectors in Namibia's long-term development plan Vision 2030. Protected areas, culture, adventure, game hunting and regional features belong to Namibian tourism. The wildlife sector can have high multiplier effects in Namibian tourism output. The game is common and usually to be found in nearly the whole country but in different habitats, not only in fenced parks. The private sector has been the main promoter of tourism since gaining independence in 1990. However, travel and tourism have the potential to create jobs at all levels of society and they represent key factors in Broad-based Black Economic Empowerment (BBEE), in which previously disadvantaged (blacks, women and disabled) people are empowered economically. The Government's responsibility for travel and tourism lies within the Ministry of Environment and Tourism (MET) and the Namibia Tourism Board (NTB).[66] According to the World Travel & Tourism Council (2006) the number of visitors to Namibia increased almost five-fold between 1990 and 2005. In 2006 about 833 350 tourists visited Namibia (NPC 2008a) and the country is generally regarded as a safe and secure destination for travellers. Namibia's tourism has been highly seasonal and mean occupancy rates are not high. However, seasonal

65 Each water point serves a mean of 535 hectares (Mendelsohn et al. 2006).

66 The White Paper on Tourism was approved by the Namibian Cabinet in 1994 and also as the Namibia Tourism Board Act in 2000.

peaks are becoming less important and the average stay in Namibia is 19 days.[67] Moreover, domestic tourism is becoming more important.

In the long term, Namibia's travel and tourism is expected to grow by 6.9 per cent annually, faster than the global average.[68] The majority of tourism enterprises in Namibia are small and medium-size (SMEs).[69]

3.3.1 COMMUNITY BASED TOURISM

Community Based Tourism Enterprises include campsites, lodges and partnerships with the private sector. Tourist numbers in community based tourism are on the increase. For example, the figure for 1999 (30 000 tourists) tripled in 2004. Community based tourism brings social and economic benefits for the communities. However, investments in community based tourism are capital intensive and must be done in a sustainable way based on normal business principles. The Namibian Community Based Tourism Association (NACOBTA) supports community based and pro-poor tourism projects by funding, giving technical assistance, and promoting best practices and financial viability. In the two research sites Kwandu and Okongo, the share of tourism is still modest but tourism is seen as an important revenue source in the future.

3.3.2 WILDLIFE

The Namibian wildlife sub-sector consists of stakeholders that represent the GRN institutions.[70] Namibia's neighbouring countries, Botswana and South Africa, have profitable wildlife based tourism and Namibia has already taken the first steps in this kind development. For example, Namibia is one of the leading countries in the whole world in nature conservation nowadays. About 20 per cent of Namibia's total land area is under conservation, including the community conservancies. Apart from the beautiful landscapes, most of these conservation areas have an abundant game population, which is a good basis for wildlife development, commercial hunting and wildlife safaris. However, there are still considerable leakages from the local

67 Most tourists (77 per cent) are Africans, 10 per cent Europeans and 4 per cent North-Americans.

68 In 2006, tourism contributed 16 per cent of the GDP, N$6 788.6 million and accounted for 71 777 jobs (17.7 per cent of employment).

69 In May 2006 there were 872 registered accommodation establishments, ranging from campsites to luxury lodges, of which 27 per cent were in the northern area (WTTC 2006). The mean occupancy rates were not high, namely 1.5 bed nights per location.

70 Forestry, fisheries, parks and wildlife, environment and tourism, community-based organisations (CBOs), non-governmental organisations (NGOs) in addition to conservancies (NPC 2008a).

economy in wildlife tourism, only 20 per cent of the generated profit is earned by local stakeholders (Martin 2006).

The Government of Namibia promotes conservancies, by which local communities manage their wildlife resources according to hunting quotas set by central controlling bodies.[71] The main aim is to give community area residents some rights over wildlife and tourism such as those given to commercial farmers. A secondary aim is to explore the possibility of rural communities improving their living conditions through this business enterprise approach. During the Second National Development Plan (NDP2) in 2001–2006 the wildlife sub-sector generated about N$8.9 million from conservancies that is: trophy hunting, wildlife capture and the sale of game meat for local consumption and export. The conservancy revenues in 1999 and 2005 are presented in Table 3.8.

Table 3.8 Conservancy revenues in 1999 and 2005, N$. (Euro1 = N$10)

Conservancy revenues in Namibia	1999	2005
Revenues of trophy hunting, N$	448 500	2 663 000
Revenues of tourism, N$	401 700	7 655 000

In Namibia there are over 2 million wild animals, the same numbers as head of cattle. Almost 90 per cent of wildlife is on freehold farms and only 10 per cent on communal land. In 2005 conservancies covered about 36 per cent of all communal land (10.5 million hectares) in Namibia and there were 51 registered conservancies with 211 120 people benefiting from the generated revenue.[72]

3.4 NEW COMMUNITY ACTIVITIES

Communities in both Okongo and Kwandu areas introduced new community activities through forest and conservancy projects in 1998–2008. These new activities can be grouped into: 1) different community trials, 2) community forestry, 3) community tourist camp site, 4) carpentry and 5) trophy hunting.

The new activities started as the projects by which *inter alia* supported the communities to have camp site facilities and office buildings. The Okongo and Kwandu communities had reasonable facilities to continue the new community

71 The policy Wildlife Management, Utilisation and Tourism in Communal Areas of 1995 and the Nature Conservation Amendment Act of 1996 have enabled communities to manage their wildlife areas (NPC 2008).

72 These conservancies had 77 tourism enterprises, of which 22 were joint ventures that include lodges, camps and trophy hunting (Mendelsohn et al. 2006).

activities.[73] Both communities already had community tourist camp sites and office buildings. In addition, Okongo had a nursery for forest seedlings. Different community trials in Okongo included guinea fowl rearing and the grinding of cereals by a hammer mill. The start of the guinea fowl rearing was modest but it increased quite quickly in households. The hammer mill trial was not successful due to the repair and maintenance costs of the hammer mill. The Okongo community used a help of an outside entrepreneur when starting the carpentry activities.

3.5 INSTRUMENTS FOR SUSTAINABLE FOREST MANAGEMENT IN COMMUNITY FORESTS

The main aim of this section is to describe and clarify the REDD-plus tool as one of the aiding instruments to sustainable forestry in northern communal area in Namibia.

Forests cover some 30 per cent of the total land area of the earth (Peskett et al. 2006) and they store a total of 638 Giga tons of carbon (GtC) in their ecosystems, of which 283 Gt (44 per cent) is stored in the forest biomass and 355 Gt (46 per cent) in soils. There is 750 Gt of carbon in the atmosphere (Brainard et al. 2009). Forestry is the third largest source of greenhouse gas (GHG) emissions (18 per cent) after energy supply and industry (Eliasch 2008), and these forest emissions are emitted from forest activities and land use changes on forest land, mostly deforestation (Stern 2007; Peskett et al. 2008; IUCN 2007).[74]

At the moment developing countries can benefit from forestry related climate change programmes held under the auspices of the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC) but only when implementing afforestation and reforestation projects. Other ways of reducing of deforestation and degradation, which could be employed by developing countries are not included in the international climate change context. Recipient countries periodically report on their land-use, forestry emissions and removals. However, estimations of emissions and removals contain large uncertainties compared to other sectors.

The most cost efficient way to achieve climate change mitigation is to prevent of further deforestation, which can lead to positive results quite quickly (Stern 2007). However, some financial incentives are needed to halve the deforestation

73 The remaining capital investment of the forest project support in Okongo was N$291 005 in 2006, or N$1 271 per household. In Kwandu in 2006, the remaining capital investment of the forest and conservancy project in buildings and equipment was N$553 119, or N$2 634 per household.

74 Natural forests contain about 250 tC/ha and they accumulate about 2.5 tC/ha/yr with a mean residence time of 100 years, whereas fast wood plantations contain about 50 tC/ha, accumulating about 5 tC/ha/yr (Pagiola and Bosquet 2009).

by 2020 and to make the global forest sector carbon neutral by 2030. The main cause of deforestation is a lack of clear and secure land tenure. Large areas of global forests are under complex informal tenure arrangements. A majority (86 per cent) of the world's forests belongs to governments and only 10 per cent have a private or communal ownership (Sandbrook et al. 2010). At least 22 per cent of forests in developing countries are owned or managed by communities (Molnar et al. 2004; Hayes and Persha 2010).

On a national level, the key issues in the reduction of forest degradation are clear property rights to forest land, the prescribed codicied rights and responsibilities of the forest users, and the involvement of local communities. According to Chattre and Agrawal (2009), larger forest size and greater rule-making autonomy are associated with higher carbon storage and livelihood benefits at the local level. The livelihoods of local forest dependent households will also be improved when decision-making rights and responsibilities are shared (Agrawal 2007; Barton el al. 2008; Nygren 2005; Ribot et al. 2006; Hayes and Persha 2010). Local communities restrict their consumption of forest products when they themselves own forest commons and engage in forest conservation. However, free-access to forest resources are not saved from degradation because individual users do not have incentives to protect the forests.[75] Secure property rights also make long-term investments worthwhile and encourage sustainable forest management on the community level. Locally forest users can be controlled, but are in many cases challenges and drivers of deforestation come from outside especially from agricultural activities (Angelsen et al. 2009).[76]

The REDD mechanism should provide incentives to protect the forest against conversions (Stern 2007). It seeks to lower emissions through paying countries for reducing deforestation and degradation (The World Bank 2010). In the REDD the avoidance of emissions by land conversions is compensated, and the opportunity costs of reduced emissions represent the costs of lost profit opportunities (not through logging or converting forest land).

The REDD payments can be based on performance and be conditional upon proven delivery (Brown et al. 2008; Sandbrook et al. 2010). Compensation is made only when actions prevent the release of forest-based carbon into the atmosphere. This can exclude small-scale bodies who lack start-up capital and reduce the incentives for more pro-poor (Peskett et al. 2008; Sandbrook et al. 2010). Investors aim to have long contracts and ex-post payments (Peskett et al. 2008). The REDD payments could also be made in link with the obtained secure land rights (Griffiths 2007; Wunder 2008; Bond et al. 2009; Sandbrook et al. 2010). The success of REDD relies on how forest management at the local level relates to forest use and

75 Forest users can be classified to be participants (directly impacted) or non-participants (Jagger et al. 2010).

76 Tropical forests are expected to be lost at a rate of 5 per cent per decade for the next 30 to 50 years (IUCN 2007).

forest land conversion. The REDD payments could increase the economic value of forest resources in developing countries and they could also be an incentive for conserving forests (Hayes and Persha 2010; Sandbrook et al. 2010). According to Angelsen et al. (2009), many REDD-plus activities require sustained long-term funding rather than short-term project funding.

A core idea of REDD-plus is to create a multilevel (global-national-local) organisational system of payments for environmental services (PES) that will reduce emission and increase forest carbon stocks (Angelsen et al. 2009). Meanwhile communities can strive to attain some benefits (Sandbrook et al. 2010). In Kwandu in Namibia forest conservation would also maintain the habitats of fauna for example.

In REDD-plus forest inventories need to be carried out regularly and systematically to measure changes in forest carbon stocks. In a country such as Namibia, which has a fairly new existing national forest inventory, communities could also be involved in the forest inventory work on the community level. New technologies allow deforestation to be monitored effectively and changes in forest cover and land use can be accurately assessed. However, monitoring forest degradation is more challenging (Eliasch 2008) for a particular household can utilize woodland for different purposes, which will make the monitoring more complicated.

REDD-plus projects need basic forest and socio-economic data, which must be collected before starting the project and after the project implementation at regular intervals to monitor the process and its progress (Angelsen et al. 2009). In the Namibia's existing Community Based Natural Resource Management (CBNRM) framework this monitoring would be an advantage. In Namibia conservancies and community forests have secure legal rights over the natural resources. Both the bodies mentioned above are legal entities that can enter into contracts with others. Conservancies and community forests could be suitable for channelling REDD-plus – or PES payments, allowing payments to be made directly to communities (Jones and Barnes 2009).

In Namibia it is important to maintain and manage the fragile natural forests for multiple uses, including home consumption, scenery and game habitat. This kind maintenance of diversity is more important than aiming at a monoculture of exotic tree species and wood production, not least due to the country's natural conditions. Reforestation projects are challenging in Namibia because of the climatic dry conditions.

In Namibia deforestation is mostly caused by clearing the land for permanent agriculture. It has been estimated that in Namibia a population increase of one person leads to about one hectare of deforestation (Erkkilä 2001). Table 3.9 shows that over the 1990–2010 period Namibia lost 73 600 ha (0.84 per cent) per year of its forest land.

Table 3.9 Forest and wooded land area in 2010 and forest loss in 1990–2010 in Namibia (Mongabay 2010, FAO 2005 and 2010).

Forested land in 2010, ha	Lost forest land in 1990–2010, ha	Other wooded land in 2010, ha
7 290 000 (8.9% of total land area)	1 472 000 (16.8%)	8 290 000 (10% of total land area)

Trends of forest cover and carbon stocks in Namibia in 1990–2010 are presented in Table 3.10. Forest cover declined by 0.92 per cent over the 2005–2010 period, when the mean carbon stock in living forest biomass per hectare was 29 tons and the annual change was -2 000t/year for 1990–2010. In 2010 the forests of Namibia contained a total of 210 million tons of carbon in living forest biomass (Mongabay 2010).

Tabe 3.10 Changes in total forest net cover and carbon stock in Namibia over the 1990–2010 period

Year 1990		Year 2000		Year 2005		Year 2010	
Ha	Million tons	Ha	Million tons	Ha	Million tons	Ha	Million tons
8 762 000	253	8 032 000	232	7 661 000	221	7 290 000	210

Source from Mongabay (2010)

Jones and Barnes (2009) have questioned if the REDD is an appropriate tool for the forests of Northern Namibia. Globally REDD-payments might most likely go to those countries that have large forest areas which store large amounts of carbon and which have high deforestation rates. Such measures (REDD-payments) could achieve deep cuts in emissions. The emission cuts resulting from REDD would be low in Namibia. However, the REDD-plus tool (or other PES-tool), which is an element of the Bali Action Plan (BAP) and includes sustainable forest management, might be useful in northern communal areas of Namibia in striving to achieve sustainable forest management. It could also play an important role in the development of community forestry. Communities need incentives in order to strive for and attain sustainable forest management and continuous benefits from their forests. These incentives could be in the form of state subsidies. Maintenance and conservation of forests are important not only for forestry but also for the wildlife and eco-tourism sectors in Namibia.

4. STUDIES ON RURAL INDUSTRIES AND LIVELIHOODS IN OHANGWENA AND CAPRIVI REGIONS IN NAMIBIA AND ELSEWHERE

The lack of communal area information has been the biggest problem in creating a thorough picture on rural industries in communities such as Okongo and Kwandu. Only within the last few years have some basic studies about rural industries and livelihoods in communal areas in relation to poverty alleviation in Namibia been published The proportion of community forest studies that use the cost–benefit analysis is even more limited. This chapter describes some earlier studies made on rural industries and livelihoods, mostly in Ohangwena and Caprivi Regions in Namibia where the two research sites Okongo and Kwandu are located. These studies gave background information on the rural industries and on poverty in Okongo and Kwandu regions.

4.1 POVERTY STUDIES

Poverty profiles of Ohangwena and Caprivi regions were the first comprehensive studies made on poverty in Namibia. These profiles clarified the basic circumstances in the pilot communities. The profiles describe the causes and consequences of poverty. These profiles combined with a study by and Levine and Roberts (2008) on poverty, inequality and polarization created the basis for the poverty analyses in the present study in Okongo and Kwandu.

The poverty profiles of Ohangwena (NPC 2004c) and Caprivi (NPC 2006a) with NHIES 2003/2004 and Population and Housing Census of 2001 (NPC 2003) gave detailed poverty information on these two regions. The population density was three times higher in Ohangwena than in Caprivi. However, Caprivi (14 528 km^2) is one third bigger in area than Ohangwena (10 703 km^2). The share of poor households was double in Caprivi compared to Ohangwena (Table 4.1). Furthermore, the share of extremely poor households was much higher in Caprivi than in Ohangwena.

Table 4.1 Poverty in Ohangwena and Caprivi Regions (NHIES 2003/2004).

Ohangwena & Caprivi	Population	Poor households in 2003/2004, %	Extremely poor households in 2003/2004, %
Ohangwena	236 798	22.7	0.2
Caprivi	86 437	43.5	7.1
Namibia	1 830 000	27.4	3.9

The regions differ in livelihoods. In Ohangwena, agriculture i.e. animal husbandry (57.9 per cent) is a more important revenue source than in Caprivi (17.8 per cent). On the other hand, wages and salaries are more important in Caprivi (32.5 per cent) than in Ohangwena (15.4 per cent). Table 4.2 shows that in 2003/2004 the adjusted mean per capita income was lower in Ohangwena than in Caprivi. This and the fact that the unemployment rate was lower in Caprivi (17 per cent) than in Ohangwena (31 per cent) suggest that Caprivi is more differentiated in its revenue formation. In 2003/2004, the mean household income was slightly lower in Ohangwena than in Caprivi as was the mean household consumption.

Table 4.2 Adjusted per capita and household income and household consumption in Ohangwena and Caprivi regions: NHIES 2003/2004, N$. (Euro1 = N$10)

NHIES 2003/2004	**Per capita adjusted income, N$**	**Household income, N$**	**Household consumption, N$**
Ohangwena	4 304	22 207	21 685
Caprivi	6 411	25 304	24 304
Namibia	10 358	43 521	42 078

The life expectancy rate is low in Ohangwena and Caprivi due to the prevalence of HIV/AIDS. In Namibia the HIV/AIDS prevalence is the highest in Caprivi and it is the main cause of poverty there. In 2001 the probability of not surviving to the age of 40 was 42 per cent in Namibia. In the Namibian rural areas the probability was 49 per cent, and in Ohangwena 57 per cent and Caprivi 55 per cent. In both Namibian regions about one per cent of children had lost both parents and more than one in 10 had lost one parent. Women headed households are common in both regions.

The living conditions are poor in Ohangwena and Caprivi. People mostly live in traditional dwellings and use wood and charcoal for cooking. Access to safe water is good but access to electricity for light is low, and access to human sanitation facilities is poor. In spreading information the radio do in both areas well and the literacy rate is high. According to the United Nations Development Programme UNDP (2007) in 2001–2004 the HDI value in Ohangwena was the third lowest in the country and in Caprivi the lowest.[77] In 2001–2004 the HPI value was also high in Ohangwena and Caprivi compared to the Namibian mean (Table 4.3).

Table 4.3 Adult illiteracy, HDI and HPI in the Ohangwena and Caprivi regions (UNDP 2007).

Region	**Adult illiteracy in 2001**	**HDI in 2001–2004**	**HPI in 2001–2004**
Ohangwena	20	0.421	42
Caprivi	20	0.403	43
Namibia	16	0.557	33

77 In 2001 the worst group was San with the HDI value of 0.359.

Levine and Roberts (2008) studied revenue inequalities and revenue distribution in Namibia. Levine's and Robert's study was the first comprehensive study after Independence (1990) in Namibia on the micro-level determination and dynamics of inequality. The study defined the underlying factors that drive the distribution of monetary welfare in Namibia. It used household unit expenditures from two nationally representative surveys NHIES 1993/1994 and NHIES 2003/2004. Their study found that in Namibian conditions, expenditure indicators capture better the informal sector's contribution to household welfare. Levine and Roberts also computed a series of measures for poverty, inequality and polarization. They used the poverty decomposition techniques developed by Datt and Ravallion (1992). They also used the growth incidence curves of Ravallion and Chen (2003) to illustrate the rate of pro-poor growth and the impact of changes in household incomes on poverty. The results showed a small but significant decrease in the incidence of poverty and a small non-significant increases in inequality and polarization. The levels of poverty fell in Namibia between 1993–2004 but the impact of welfare change was uneven among different social groups.

4.2 FORESTRY STUDIES

The forest resource (Barnes et al. 2005) and forest inventory summaries of Ohangwena and Caprivi regions created the basis for analysing the forestry in the study. In cost–benefit analysis (CBA) the number of studies, which have used the method in community forestry is still limited. Three Nepalese studies (Dahal 2006; Dahal 2007; Bhattarai and Ojha 2001) that were conducted to clarify equity impacts by benefit–cost ratios, positive and negative externality effects of community management. However, these three studies did not take into account the whole economy of the community forest area as was done in this study. The CBA as a method has been used more in conventional forestry. One example of this is Niskanen's (1998) study on the financial and economic profitability of reforestation in Thailand and the Philippines.

Barnes et al. (2005) produced detailed standing volume forests accounts for each region in Namibia. The standing woody biomass volumes made up the physical asset accounts. The flow accounts presented the volumes and values. The value of standing forest resources in Ohangwena and Caprivi in 2004 and their contribution to GNP are presented in Table 4.4.

Table 4.4 Standing forest resources and contribution to GNP in Ohangwena and Caprivi regions in 2004, N$. (Euro1 = N$10)

Ohangwena and Caprivi	Standing forest resources, million, N$		Forest's contribution GNP, million, N$	
Year 2004	**Ohangwena**	**Caprivi**	**Ohangwena**	**Caprivi**
Fuel wood	1 933	743	102.1	39.2
Poles	484	45	27.8	2.6
Saw timber	16	440	0	0
Non-wood forest products	1 010	388	47.4	18.2
Total	3 443	1 616	177.3	60.1

Barnes et al. (2005) calculated the outputs, contributions to the gross national product (GNP) and employment in 2004, which were valued to monetary asset accounts. The value of natural assets was measured as a resource rent that could be generated from the use of natural assets within 30 years. The net present value (NPV) method was used to estimate future returns at present values. The asset accounts also included the depletion, degradation, conversion and accumulation of stocks.

Dahal (2006) examined the equity impacts of community forests by using cost–benefit analysis among selected community forest user groups in the Arun River Valley in Nepal. That study analysed the material values and intangible benefits of forest on eight major types of community forest products. The total costs of forest use and management were classified into labour costs, transaction costs and membership fees. Benefit–cost ratios were calculated for three income groups (poor, medium and rich). Dahal concluded that the current practices of community forest management had a negative impact on the rural poor. An equitable system of benefit and cost sharing was missing among the forest user groups and households. According to Dahal (2007) in later publication the households failed to internalize the community forest benefits. In contrast, the middle income households could internalize 37 per cent of gross benefits and costs, and had zero net benefits. Moreover, the rich households got a higher percentage of net benefits and paid lower percentage of gross costs without providing any compensation to the poor households. Their net benefit was positive. Bhattarai and Ojha (2001) studied the distribution impact of community forest management on three economic groups (rich, medium and poor) in two user groups in the Koshi Hills in Nepal. The objective of their study was to assess the benefits and costs of the community forest management processes. Bhattarai and Ojha (2001) found that the poor users gain negative benefits from community forestry, whereas the middle-income group got the most net benefits. Those authors also concluded that the views of the poor are not taken into account in community forestry decision making. Forest management systems are mostly controlled by the rich. The poor and disadvantaged should

have increased access to decision making on forest management and utilization. According to this information sharing, training and capacity building are needed.

Niskanen (1998) examined the economics of plantation forestry investments in Thailand and the Philippines. He assessed the financial and economic profitability of investments on selected environmental impacts. Niskanen used a step-wise CBA, which was extended to the profitability analyses from financial to economic and further still from economic to environmental. The economic profitability analysis was based on the Little-Mirrlees-Squire van de Tak approach. Economic profitability estimates were compared with the monetary values of selected environmental impacts of reforestation.[78] Carbon sequestration and transpirational water consumption were found to be the most important environmental and economic impacts of reforestation.

4.3 AGRICULTURAL STUDIES

A study by Mendelsohn et al. (2006) on farming systems comprehensively described for the first time the small-scale cereals and livestock farming in communal areas in Namibia and gave some basic background information for the present study. Another study by Teweldmehidin and Conroy (2010) *inter alia* compared the information on draft animals. Moreover, Barnes et al. (2001) study gave the basis for the on financial and economic budget and cost–benefit models for different types of cattle enterprises.

Mendelsohn et al. (2006) studied communal farming systems in Namibia.[79] The main commodities in Namibia were found to be millet (mahangu), sorghum, maize, goats and cattle and the inputs were low. The production is used for domestic consumption and for the supplementation of the non-farming activity income.[80] Turpie et al. (1999) and Martin (2006) studied agriculture in Caprivi. The net cash revenue of agricultural production was N$284/ha in 1999 and NS$946/ha in 2006. In Caprivi region the livestock numbers are quite close to the land carrying capacity.[81] In comparison, the Ohangwena region livestock numbers are already too high and cause land degradation.

78 Soil erosion, nutrient loss on harvesting, transpirational water consumption and carbon sequestration.

79 Small-scale cereals and livestock farming is characterised by being open grazing and a typical farming household consists of: 6 people, 3 hectares of millet, 30 goats and 5 cattle, a harvest of 900 kg per year with a market value of N$ 2 000 (in 2006) and uses147 days of labour. Annual sales or in-kind values from slaughtering 5 goats and 1 cow amount to N$3 000 (Mendelsohn et al. 2006).

80 The small-scale cereals and livestock farming system amounts to less than N$ 5 000 per year per household (Mendelsohn et al. 2006).

81 According to Martin (2006) there were 2 764 cattle in Kwandu.

Teweldmehidin and Conroy (2010) analysed the value of the use of Draught Animal Power (DAP) systems by smallholder farmers in the Eastern Caprivi Region and tested the economic viability of DAP versus tractor usage. The main objective of their study was to quantify the status of smallholder draught power production systems in Caprivi region. The study used Rapid Rural Appraisal (RRA) approach including a survey. Crop Enterprise Budgets (CEB), project reports, expert opinion and group discussion were also used. The CEBs depicted the economic viability of crops per hectare. According to this study animal power performs better in terms of physical productivity compared to tractor usage. Draught animals are most appropriate for small farms and local transport. Many farmers prefer manual labour so as not to risk their limited resources on technology.

Barnes et al. (2001) carried out a study on financial and economic budget and cost–benefit models for different types of cattle keeping in Botswana namely: 1) small-scale livestock keeping, 2) medium to large scale cattle post-livestock production, 3) commercial livestock production, 4) commercial wildlife viewing tourism, 5) community wildlife use in high quality wildlife areas, and 6) community wildlife use in low quality wildlife areas. The research compared three different veterinary fencing, animal movement control options and assumed that a large-scale cattle development would be expanded in Ngamiland, Botswana. The main findings of the study were that the wildlife based tourism is economically extremely efficient in a high quality wildlife area and should be promoted. Moreover, small-scale livestock production has potential. Small-scale livestock production is significant when it comes to subsidies but inefficient in the case of open access grazing.

4.4 WILDLIFE STUDIES

Studies conducted by Martin (2006), Bandyopadhyay et al. (2007) and Barnes (2001) provide the foundation for the wildlife management in this study. Martin (2006) studied the wildlife co-management in the Kwando area in Caprivi. Kwandu Conservancy belongs to the Mudumu North Complex, which is a co-management area of 4 230 km^2 with a potential wildlife habitat of 86.2 per cent (3 646 km^2) and is situated close to the Kwando River. Kwandu Conservancy is 4.9 per cent of the total Complex area. Its effective wildlife area is 83 km^2, which is 41.8 per cent of the total area of Kwandu Conservancy. However, cattle raising reduce the area's value as a wildlife habitat. The sustainable carrying capacity for cattle in Mudumu North Complex is 1 livestock unit (LU) to 10 ha. In Mudumu blood-sport hunting enhances the proliferation of other wildlife species and their habitats[82]. The optimum

82 Daily rate of hunting is NS$7 000.

density of elephants is important in reducing conflicts with local people. In Caprivi the net revenue of eco-tourism is derived from low density ecotourism operations with high daily rates and more than 30 per cent occupancy (Table 4.5).

Table 4.5 Kwandu Conservancy revenues compared to Mudumu North Complex/Caprivi region revenues, N$. (Euro1 = N$10)

	Wildlife net revenue, N$/ha	Sports hunting, net revenue, N$/ha	Eco-tourism, net revenue, N$/ha
Mudumu North Complex	29	42	35
Kwandu conservancy	5	28	3

According to Martin (2006), the total net revenue in Kwandu in 2006 was N$2 025 560, or N$102/ha. The share of crops was 32.5 per cent (N$33/ha), cattle 32.5 per cent (N$33/ha) and wildlife 35 per cent (N$36/ha).[83] Bandyopadhyay et al. (2007) and Nknoya et al. (2008) studied the activities in natural resource management of the communities. Participation in conservancy activities allows households to play an active role in the natural resource management and to receive benefits (Bandyopadhyay et al. 2007). The communities located in a low resource potential area may have to use resources extensively in order to meet their subsistence needs (Nknoya et al. 2008). Farming and wildlife conservation often complement each other, particularly when productivity is low. The same land can be used for livestock, tourism, game meat production or trophy hunting. According to Bandyopadhyay et al. (2007), in Caprivi Region Community Based Organisations (CBOs) and conservancies separately do not provide significant welfare benefits but CBOs and conservancies combined do make a difference in household welfare. Active simultaneous participation in conservancy and other CBOs is strongly associated with higher household welfare in Caprivi. Communities that invest in conservancy development can expect high returns (Barnes et al. 2001; Bandyopadhyay et al. 2007). The revenue from conservancies can be distributed by village-level pay-outs, individual cash pay-outs to registered members, conservancy social funds or expenditures on social services. It has been observed that the individual cash pay-outs to registered members have a greater potential to improve the livelihoods of households.

Barnes (2001) studied wildlife utilization in Botswana to ascertain whether wildlife contributes or can contribute positively and sustainably to the national income. He also examined how different wildlife uses could be combined to maximise

83 The share of crops was N$651 080, cattle N$662 130, and wildlife N$712 360, of which the share of blood-sport was N$550 050. In wildlife revenues the share of elephant culling was N$33 170 and hippo sales N$72 850. The eco-tourism revenue was N$56 290.

income generation and to justify investments in the sector. The particular focus of the study by Barnes was on the direct use value. That author used financial and economic models of different land uses combined in linear programming and CBA. A short list of 10 wildlife use categories was compiled and budget and expanded cost–benefit investment models were developed for each category. The models measured financial profitability (annual net income, financial rate of return and financial net present value) for each activity from the point-of-view of the user or investor. The models also measured economic efficiency by using such metrics as annual contribution to gross and net national income, economic rate of return and economic net present value for each activity[84] in economic or shadow prices. The study showed that the wildlife sector is economically efficient and contributes to economic development in Botswana. Non-consumptive tourism in high quality wildlife use gave the greatest economic returns (Barnes 2001). Safari hunting, community wildlife use and limited intensive ostrich and crocodile production should be given priority in decisions on investment.

84 Sub-sectors: wildlife viewing tourism, safari hunting tourism, community use of wildlife, game ranching, intensive ostrich and crocodile farming, elephant culling and wildlife product processing.

5. METHODS

The study used CBA as a principal method to ascertain net benefits of different rural industries: forestry, agriculture, wildlife and eco-tourism. Moreover, CBA was used to compare the economic effect of these activities on poverty alleviation in Okongo and Kwandu Community Forests. The study also describes components of production and rural business management. The choice of CBA took into account the repeatability and practicability of the method, in the context of community forest development in Namibia. The basis of CBA is an analysis of the benefits, costs, and net benefits of an enterprise or activity over time. These benefits and costs are also the key tools in community forestry management, thus CBA provides a method for comparison and selection of the best economic option. This kind of tool is also useful in developing nascent rural industries in the communities. The strength of CBA is in analyzing projects. Community forestry could be regarded as such a community project, especially when it has not yet developed into mainstream rural industry in a community. The study also used CBA as an aid in determining the possible REDD/PES/state subsidy payments to support the development of the sustainable forest management.

5.1 COST–BENEFIT ANALYSIS

The origin of CBA is in welfare economics of the 19th century. However, the start of its practical use was in 1936 with the Flood Control Act in USA, which established the method into a firm conceptual framework. In 1958 Eckstein, Krutilla and Eckstein and McKean linked CBA to the theoretical literature of welfare economics. A benefit was defined to be any gain in welfare (utility) whereas a cost was any loss in welfare. In general, the use of CBA has been more common in the USA than in Europe. In the natural resource sector it has been used with societal entities such as wildlife and the environment. The CBA method enables one to decide how to prioritize the use of resources. However, its optimum use faces many challenges in relation to the treatment of long-term effects, risks and uncertainties.

Pearce (1983) defined CBA to be a technique that measures benefits (gains) and costs (losses) of individuals, which are expressed in monetary terms. According to Hanley and Spash (1993) CBA is a method that systematically organizes arguments about whether a project or policy should go ahead or be discontinued. Boardman et al. (2006) stated that CBA is a framework to make comparisons and describes how optimally to allocate resources.

The CBA method is often used for projects and it follows certain steps (Hanley and Spash 1993). These steps were also followed in this study of the enterprises in the Okongo and Kwandu communities. The first step was to define the project and its resources, gainers and losers. In Okongo and Kwandu the project was 'community forestry' and the resources were the community forest and conservancy areas. Members of community forest and conservancy were gainers and losers. In the second step the impacts of the project were identified. The other Okongo and Kwandu rural industries (forestry, agriculture, wildlife and eco-tourism), which have impacts on the community and household levels were identified. The third step was to identify the economically relevant impacts which add positive utility or which use resources. The data sources of different rural industries of Okongo and Kwandu were identified and specified in more detail. The fourth step was the physical qualification and quantification of relevant impacts, including benefit and cost flows in monetary terms over specified project analysis periods. In this study, benefits, costs and net benefits of different rural industries for the years 2003–2008 were calculated. Those were converted into present values by discounting.

The CBA is carried out in real terms. In CBA the future benefits and costs are discounted relative to present benefits and costs in order to obtain their present values (PV) (Equation 5.1). The welfare is maximized when the largest positive net present value (NPV) is chosen. The net benefit (B–C) gives an absolute value of profitability.

$$[5.1]\ NPV = PV(B) - PV(C)$$

NPV = net present value, PV = present value, B = benefits, C = costs

A cost or benefit that occurs in year *t* is converted to its present value by a discount factor. The Discount Factor (DF) is (Equation 5.2)

$$[5.2]\ DF = \frac{1}{(1+r)^t},\ r = \text{discount rate},\ t = \text{time period},$$

$$\text{Present Value} = \text{Value at time t} * \frac{1}{(1+r)^t}$$

$$\text{Future Value} = \text{Present value} * (1+r)^t$$

The present value of benefits is (Equation 5.3)

$$[5.3]\ PV\ (B) = \sum_{t=0}^{n} \frac{B_t}{(1+s)^t}\ , \text{ and}$$

The present value of costs is (Equation 5.4)

$$[5.4]\ PV\ (C) = \sum_{t=0}^{n} \frac{C_t}{(1+s)^t},\quad n = \text{number of observations, s = social discount rate}$$

Various groups can be treated differently in CBA by using distributional weights, which are used to help in the measurement of the true social value of benefits and costs (Boardman et al. 2006). In the CBA method, it is of no consequence who receives the benefits and suffers the costs i.e. who enjoys a high or low level utility (Johansson 1993). This is also the case with community forestry in Okongo and Kwandu. The benefits and costs are common and the net benefits are assumed to be distributed between households of the same size. A change that makes at least one person better off while no one else becomes worse off constitutes a positive change in total welfare (Brouwer and Pearce 2005). The new community activities should provide net gains so that losers could be compensated and aggregate wealth can be maximized. Accordingly community forestry could be a valuable rural industry, if its net benefits are positive and it increases the utility level (welfare) of all stakeholders. Such stakeholders include households and joint venture partners of the national economy. However, the excess of benefits over costs in community forestry does not mean that the community should necessarily continue with this rural industry. The community itself has to compare all revenue sources and see how community forestry is ranked in its utility offering among the other rural industries. When evaluating the project (community forestry) reallocations, benefits of the project in addition to the reduction of benefits of other projects (i.e. other rural industries) should be evaluated. For example, if a project has positive net benefits, but all those benefits go to other stakeholders such as joint venture partners or the government, then the acceptability of the project for development might depend on institutional change, which allows the community households to capture more benefits. As Boardman et al. (2006) generally state about resource allocation, the community should only invest in activities that earn a higher return than could be earned by investing the resources elsewhere and also to choose the combination that maximizes net benefits. This is relevant to the Okongo and Kwandu communities.

In this study the earlier forestry and conservancy projects were regarded as real capital and human capital investments, which were important and needed when starting the community forestry activities in 2006. Moreover, these projects might

have advanced community forestry activities quicker and in more professional ways. In CBA those costs are sunk costs, which no longer appear in the costs and are therefore irrelevant in decision-making.[85]

The depreciation values of the earlier projects of the 1998-2005 period (a forestry project in Okongo and forestry and conservancy projects in Kwandu) were calculated but not included in the CBA. The calculations were made to show that the communities did not start their community forest development entirely from scratch in 2006. The important point to consider is that CBA assesses the net benefits that can be generated from the start of the project analysis period based on the resources available for investment, including those assets resulting from sunk costs, and also any new investments.

In the context of CBA the costs and benefits of activities should always reflect their **opportunity cost.** According to Gittinger *(*1982) opportunity cost is the value of a product or service in its next best alternative use. Dasgupta and Pearce (1972) have stated that the opportunity cost is the benefit derived from the expenditure in question compared to the benefit that would have been obtained if the money had been used elsewhere. According to Brouwer and Pearce (2005) an environmental sector opportunity cost is a benefit forgone when a scarce resource is used for one purpose instead of the next best alternative. In community forestry the opportunity costs would increase substantially, if forests are more intensely used in quantity and quality.

The allocation of goods or services is Pareto efficient when no alternative allocation can make at least one person better off without making anyone else worse off (Hanley and Spash 1993; Boardman et al. 2006). **Pareto efficiency** is incurred when the marginal benefits of using a product or service are equal to the marginal cost of supplying the same product or service. Net benefits indicate whether or not it would be possible to compensate those who bear the costs sufficiently to such an extent that no one is made worse off. Positive net benefits indicate the potential for Pareto efficiency. The concept of **Pareto optimality** is one of the key concepts of CBA (Dasgupta and Pearce 1972). Pareto optimality is the attainment of economic efficiency in the production of goods and services and resource allocation in a manner consistent with consumer preferences (Brouwer and Pearce 2005). However, in the context of poverty alleviation, Pareto optimality might be too restrictive a criterion to use. The poor lack those resources for their production enterprises and thus these are not able to meet their needs and preferences.

According to the **Kaldor-Hicks criterion** a policy should be adopted, if and only if those who gain can fully compensate those who lose and that those who

85 These earlier investments can have three different types of residual values: 1) salvage value of capital assets (buildings), 2) working capital and 3) items that have a substantial useful life remaining at the end of the project (land, livestock).

gain are still better off (Hanley and Spash 1993; Dasgupta and Pearce 1972). Kaldor (1939) stated that the winner from a project could in principle compensate the losers, and Hicks (1939) that losers cannot bribe the potential winner not to undertake a project. If the monetary value of benefits exceeds the costs, the gainers (those who receive the benefits) can hypothetically compensate the losers (those who bear the costs) and still have some gains left over (Dasgupta and Pearce 1972). The Kaldor-Hicks criterion selects projects in order of their efficiency and assesses their worth according to NPVs. Johansson (1993) assumed that when a project such as community forest moves the economy from state A to state B some individuals gain from the change whereas others loose. Revenues would be redistributed among individuals without any costs. According to the Kaldor-Hicks criterion a project such as community forest can hypothetically redistribute revenues so that everyone becomes better off. Gainers should be able to compensate losers. Institutional or policy changes may play a role in such a situation. Nevertheless, an efficient action is still an improvement regardless of whether any compensation is actually paid, and the Kaldor-Hicks principle does not actually require compensation to be paid. When there is a need for substantial poverty reduction, redistribution of benefits and costs may not occur fairly, when taking into account of the poor and their improvement. Therefore, the FMC should look after the fairness of the distribution of net benefits in the community forestry.

The market price is commonly the best estimate of marginal value product and of its value (Gittinger 1982). But as Gittinger (1982) and Pearce (1983) have stated CBA prices need not be market prices. **Shadow pricing** can be used when there are no obvious markets and the market price is not a good indicator of price. Shadow pricing is aimed at establishing the true opportunity cost of the input. According to Hanley and Spash (1993) shadow price is used to reflect the true scarcity of a resource, to correct for imperfect competition, government interventions in markets and the absence of markets. Gittinger (1982) noted that valuation problems exist related to goods and services, which are not commonly traded in competitive markets. Shadow prices (sometimes also called accounting prices) are often used instead of market prices in developing countries. Seo et al. (2009) have valued home consumption at market value of each product. This study used concurrent prices for sales in Okongo and Kwandu. Shadow prices were used in the agricultural and forestry home consumption. The shadow prices were calculated by using the household survey information, different statistics and the community group interviews. Prices between Okongo and Kwandu differed (See heading 6.6). Livestock prices in particular were higher in Okongo than in Kwandu. Reasons for this might have been the differing marketing opportunities between the two areas and also the cultural background. The Oshiwambo speakers in Okongo are culturally more oriented towards livestock production than the SiLozi speakers in Kwandu, and cattle are also more highly valued in Okongo.

Labour is still a major non-tradable input in rural areas in developing countries. The reasons for this are the high number of unskilled workers, segmented labour markets and the limited labour mobility due to the land tenure systems (Boardman et al. 2006). However, the presence of unemployment in a community does not necessarily mean that the labour hired would have otherwise been unemployed (Campbell and Brown 2009). Agricultural and forestry work is supposed to be carried out by the household members at times when they do not have opportunities for other productive employment. In such a case the opportunity cost of family labour might be close to zero, but the incremental net benefit of labour is greater (Gittinger 1982). The opportunity cost of a labourer is the economic value of his/her annual earnings. If the labour markets of skilled workers function reasonably well, the market wage is used (Boardman et al. 2006). The wage rate for unskilled workers can be obtained by using the productive time and the estimated value of the worker's output. Labour can be valued as a daily wage, which can be a certain percentage of the market rate. The annual shadow wage for an agricultural labourer can be estimated by using the number of days in agricultural work, multiplied by the daily wage rate. The present study used this method to estimate labour in Okongo and Kwandu by calculating the number of hours of a certain agricultural or forestry activity, multiplied by the national farm worker's minimum hourly wage (N$2.25/hour) or N$23 per day, according to the Labour Act. The same rate applies throughout the whole country. The minimum farm workers' monthly salary (N$428), and hourly wage, were agreed in 2003 by the Namibia's Farm Workers' Union (NAFWU). In addition food (or a monthly food allowance of N$210) and housing (including sanitary and water facilities) are included in a farm workers' salary. These two additional payments were not included in the hourly rate calculated in this study. The total mean value of the farm worker's daily salary was estimated to be N$50 per day, and in this study a value of N$23 was used, which was 46 per cent of it. Between the years 2006 and 2008 there was no nominal wage increase. By 2008 the real wage increase had been negative, – 6.7 per cent. The weekly working hours were 45 hours (LaRRi 2008).

Discounting is a mechanism by which the value of economic resources and services at different times can be compared. In discounting, the benefits and costs are conventionally expressed in real terms, i.e., inflation is not taken into account. The values are expressed in terms of a base-year set of prices and costs (Pearce 1983). This includes uncertainty about the presence and preferences of individuals and on benefits and costs. Uncertainty is usually expected to increase over time (Pearce and Turner 1990). A discount rate can be a consumption rate of interest, which is based on the rate of time preference, or it can be based on an opportunity cost of the marginal productivity of capital (Pearce, Barbier and Markandya 1990). Discounting is an important issue in environmental management, because the effects are long-lived and have benefits that occur far into the future (Hanley and

Spash 1993). Discounting reflects the way people behave and value things. High discount rates mean that higher benefits accrue to resources that are used now rather than in the future. Higher discount rates tend to mean more rapid exhaustion of resources (Pearce and Turner 1990). An appropriate discount rate should reflect the opportunity costs of the funds. The discount rate at which the NPV becomes zero is called the internal rate of return (IRR), and there may be more than one discount rate at which the NPV is zero. The IRR gives information on how sensitive the results are to the discount rate. One should choose the project in which the IRR is greater than an appropriate social discount rate (Boardman et al. 2006). Mnopelwa (2006) used interest rates of 5, 10 and 15 per cent in a study based on the Okavago Delta, Botswana. According to Hepburn and Koundouri (2007), a constant discount rate is appropriate, but the discounting rate could also decline over time starting with the higher discount rate of say 3.5 and decline over the long run to 1 per cent. In this study the period was short, only 6 years, and a constant interest rate was used for all years using the base-year of 2006.

CBA is **criticized** for accuracy, non-commensurability and income distribution. According to Boardman et al. (2006) the usefulness of CBA depends on its accuracy. The accuracy and income distribution depend on how exactly the benefits and costs have been estimated and how aware the people are of the income distribution details. In this study, the basis of accuracy lies with the performance of the household surveys and the project and community level bookkeepings. The data collection of the Okongo and the Kwandu household surveys in the field was assumed to be carried out properly. The field teams were expertly trained and supervised. The language requirements were also taken into account. The bookkeepings of the Okongo and Kwandu communities were checked to ensure that entries were made properly and correctly. Non-commensurability exists particularly when no monetary values exist. This is common at the community level. The CBA appeared to be a practical and flexible method for analysing community level data, which are limited but which consist of several categories of data from different sources. When considering reliability, the quality of community level data is important. Data of the necessary quality are not attained without the required basic education, long-term training and monitoring/auditing of FMCs. In Okongo and Kwandu the earlier forestry and conservancy projects and their contempareous training and monitoring made it possible to get satisfactory data. At community level, the determination of shadow prices is important but sometimes quite time-consuming, due to the data formats encountered.

Pearce (1983) stated that CBA is a normative economic procedure. However, the method is also criticized for being subjective. The Kaldor-Hicks criterion has also received some criticism, because it states that a resource reallocation is desirable, when the gainers compensate the losers and still are better off. However, no actual compensations need to take place (Hanley and Spash 1993). The CBA

treats gains and losses equally and so it is of no consequence who actually gains and who actually loses. One might assume that the government should use transfers and other policy instruments to ensure the appropriate redistributions of benefits. This is obviously important as a next stage in the analysis and for planning sound community development.

The present study took labour costs into account when comparing the different rural industries. Generally labour costs in developing countries are expected to be insignificant. However, in CBA the costs are as important as the benefits. Hanley and Spash (1993) have noted that a problem for consumers is to choose the most preferred set of goods. A rational consumer such as the FMC is always expected to choose the most preferred alternatives. In a newly established community forest this might be a little complicated. A consumer such as the FMC is assumed to be able to compare various bundles of goods and rank them in order of preference. The FMC should be able to take into account the development of the community forest and all of the community forest members. This needs both training and experience.

5.2 USE OF COST–BENEFIT ANALYSIS AT THE COMMUNITY LEVEL

The study generated detailed community net benefit tables (Annexes 2–7) for the years 2003–2008, which made it possible to compare rural industries and different years. These elaborated net benefits were also used for determining the poverty changes and for calculating possible compensation from REDD-plus/PES/state subsidy tools.

The benefits and costs of sale and home consumption of agricultural produce in Okongo and Kwandu were determined for vegetables, fruits, cereals, livestock and other farm revenues. In forestry they were determined for wood products, non-wood products and medicinal plants. The benefits and costs of community group activities such as water point committees *inter alia* were also determined.

Account was also taken of the community level benefits and costs in Okongo for: i) new community trials (guinea fowl production, grain milling and carpentry) in 2005-2008, ii) community forestry in 2005–2008, iii) a community tourist camp site in 2005–2008 and iv) other (forestry project, rent, FMC and a vehicle) in 2005–2008. Account was also taken in Kwandu of: i) a human-wildlife conflict subsidy or insurance scheme (HACSIS) in 2004–2008, ii) community forestry in 2003–2008, iii) a community tourist camp site in 2005–2008, iv) a trophy hunting joint venture in 2003–2008 and v) other financial investment considerations in 2004–2008.

The household survey method is explained under heading 6.2. Bookkeeping analysis of earlier projects on new community activities is described under heading

6.3. Community bookkeeping analyses are shown under heading 6.4 and community interviews for data collection are shown under heading 6.5.

In agriculture, forestry and community group activities, account was taken of the changes in the rural population, which was calculated using a growth rate of 0.4 per cent per annum between 2001 and 2008 inclusive (UN 2011). The CBA did not include other household income (such as salaries) from employment outside the community forest, because the aim was to compare the different rural industries relating to community forests. Moreover, the household survey did not give detailed information on activities outside the community forest area. Taxes were not taken into account. Firstly, taxes are not normally taken into account in CBA. Secondly, communities did not pay taxes. Communities did not have any loans in respect of the community forest or conservancy. Communities did not pay rent on their land.

The present study measured the net benefits of different rural industries to define the most economic option and to clarify the trend of community development, especially for community forestry and poverty alleviation. The net benefits were also used to clarify the likelihood of getting some subsidy through a REDD-plus, other PES or state subsidy tools to maintain the community forest area sustainably. The benefits, costs and net benefits were calculated from the point of view of the whole community forest area. The mean benefits, costs and net benefits for each household were calculated by dividing the community forestry area figures by the number of households in the community forest area.

5.3 BENEFIT–COST RATIO (BCR)

The study also used Benefit–Cost Ratios (BCR) in defining the economic profitability of different years in Okongo and Kwandu in 1998–2008. The BCR is a discounted measure of project worth. BCR is a relative profitability. It is calculated by dividing PV (Benefits) by PV (Costs) (Campbell and Brown 2009) (Equation 5.5).

[5.5] When NPV $\geq$ 0, then BCR $\geq$ 1, and when NPV $<$ 0, then BCR $<$ 1

This method is no longer commonly used. Boardman et al. (2006) recommend avoiding the use of the benefit–cost ratios, which are percentages, and instead rely on net benefits to rank policies. The reason these authors gave was the benefit–cost ratio can sometimes confuse the choice process when the projects are of a different scale. Moreover, Lund (1992) warned not to use the benefit–cost ratios due to the economically arbitrary nature of most classifications of benefits and costs. This criticism might also apply when ranking different projects of different lifetimes. The absolute value of the benefit–cost ratio varies according to the interest rate

chosen. Benefit–cost ratio indicates how high the costs could rise without making the project economically unattractive (Gittinger 1982). The benefit–cost ratio is another way to present the NPV (Hanley and Spash 1993). When using the BCR for evaluating a tourist camp site community project, one has to have all the costs and all the benefits within the boundary of the analyzed project in order to obtain the correct BC ratio. The CBA cannot be used simply to rank alternative options according to which is preferable, unless the initial investment (PV of the cost stream) is the same for all options. It is necessary to consider all factors when choosing the preferable option. When properly used, the BCR allows some sort of ranking of the alternative options. Nowadays, net benefits are used more commonly at community level instead of BCRs.

In this study both the BC ratios (namely net benefit–cost ratios) and net benefits alone were used to rank the different years for the 2003–2008 period for Okongo and Kwandu. The structure of the rural industries was slightly different between these two sites. However, the common trends of rural industries of these communities were analyzed and compared.

5.4 NET BENEFIT–INVESTMENT RATIO (NBIR)

The study calculated the Net Benefit Investment ratios (NBIR) for rural industries. These are more suitable than Net Benefits or Benefit–Cost Ratios to compare economic activities (Equation 5.6). NBIR is the present worth of the net benefit divided by the present worth of the investment (Gittinger 1982).

$$[5.6] \quad \sum_{t=1}^{t=n} \frac{(N_t)/(1+i)^t}{(K_t)/(1+i)^t}$$

N_t = incremental net benefit for each year after the stream has turned positive
K_t = incremental net benefit for initial years when the stream is negative
t = time period
i = discount rate

An incremental net benefit (or cash flow) is the basis for the NBIR calculation. The net benefit is taken from those years during which the stream is positive. The investment is taken from those years during which stream is negative. In the case of the present study it was negative from the early years of the project. The net benefit–investment ratio is expressed at a certain discount rate (e.g. 6 per cent) as present worth of positive incremental net benefit is divided by present worth of negative net benefit.

In the first years of a project the incremental net benefit stream is usually negative and then it turns positive. If an occasional negative incremental net benefit occurs

later, then an increase on capital is not needed. The selection criterion is to accept the discounted projects with net benefit–investment ratio of 1 or greater. The largest ratio value is chosen first.

When the net benefit–investment ratio is used to rank projects, the benefit–investment ratios must be calculated for all projects. The method is suitable for real-life project investment decisions (Gittinger 1982). It can be used when sufficient funds are not available to implement all projects. The method is also suitable when budget constraints vary. Estimates can be made quickly of how much investment could rise without making the project economically unattractive using this method. According to Gittinger the NBIR is a discounted measure of project worth that can be used to rank alternative projects with a high degree of confidence.

5.5 COMPARISON OF LAND AND LABOUR PRODUCTIVITIES

Productivity is the output of any aspect of production per unit of input. According to Freeman (2008) labour productivity is the ratio of a volume measure of output divided by a measure of input use (Equation 5.7).

[5.7] Labour productivity = Volume measure of output / Measure of input use

Volume measure of output = Gross Domestic Product or Gross Value Added
Measure of input = The total number of hours used of total employment

Labour productivity measures the amount of goods and services produced by one hour of labour. It is a dynamic measure of economic growth, competitiveness and living standards within an economy, which is used to explain economic growth and social development. Growing labour productivity depends on three main factors: investment and saving in physical capital, new technology and human capital.

The volume measure of output reflects the goods and services produced by the workforce. It is measured either by gross domestic products (GDP) or gross value added (GVA). A measure of input used reflects the time, effort and skills of the workforce in producing goods and services. Labour input is measured either by the total number of hours worked of all persons employed or by total employment. Total employment is less recommended as a measure of labour productivity because it neither reflects changes in the mean work time per employee nor in multiple jobs, or self-employed persons.

Land and labour productivities of the Okongo and Kwandu rural industries were calculated to compare factors of production (Equations 5.8 and 5.9).

[5.8] Labour productivity = Value added / Number of days worked

Value added = Value of production (including home consumption) – Value of inputs

Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs from the total. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources.

[5.9] Land productivity = Value added / Hectares of land used

Value added = Value of production (including home consumption) – Value of inputs

5.6 CHANGES IN POVERTY

Poverty is typically measured as the distribution of real consumption or revenue, including in-kind revenue and own production (Ravallion 2004). In absolute poverty the households are ranked by either consumption or revenue per person (Ravallion 1998). The information is normally obtained from randomly sampled households in socio-economic surveys.

According to Ravallion and Chen (2003) differences in revenues can be calculated by using the growth incidence curves and the growth of mean revenues are thus determined (Equation 5.10).

[5.10] $[Q_2 (p) - Q_1 (p)] / Q_1 (p) \geq g,$

where g = growth in mean revenues

The differences between two periods can be calculated by using Equation 5.11.

[5.11] $[Q_{t+1}(p) - Q_t (p)] / Q_t (p)$

Q (p) = income or real consumption, t = time

The present study has used the net benefits for formula 5.11. Poverty changes for the years 2006 and 2008 were based on the differences of the total net benefits of these years. A concept of net benefit was used for Q (p), which also included home consumption (Equation 5.12).

[5.12] $[Q_{2008}(p) - Q_{2006}(p)] / Q_{2006}(p)$

Q (p) = net benefit

According to Sen (1992) the poor in a community can be classified by using the headcount index (H). Ravallion (1995) has also used the method of headcount index (Equation 5.13).

[5.13] $H = q/h$

where:

q = number of people who are identified as being poor,
h = total number of people in community.

In this study the household level poverty was calculated based on the Okongo and Kwandu household survey datasets (Annexes 14 and 15).

According to Ravallion (2010) data are often a problem in developing countries. Furthermore, one can underestimate the cost of living in poor countries due to price differences. In developing countries the labour intensive traded goods tend to be relatively cheap. If their values are used to compare with other countries, Purchasing Power Parity (PPP) conversion rates should be used (Taylor and Taylor 2004).

Poverty is linked to inequality. The greater the inequality, the more difficult it is to follow the poverty (Ravallion and Chen 2003). Inequality is expressed by the Gini-coefficient. It is computed as the area between the Lorenz curve and the 45 degree line. The former shows the relationship between the cumulative percentage of households and revenues, whereas the latter is the function of perfect equality of income. The greater the extent of deviation, the greater is the degree of inequality. The Lorenz Curve in rural areas of Namibia is more concave than the urban or total national curve (NPC 2008b), which indicates greater income inequality.

5.7 INSTRUMENTS FOR SUSTAINABLE FOREST MANAGEMENT IN COMMUNITY FORESTS

In this study the REDD-plus, other PES or state subsidy payments are regarded as a means to achieve sustainable forest management. The stock of renewable resources is not fixed and can increase or decrease. The aim should be to obtain continuous flows renewable resources through time. In the long run the rate of harvesting must equal the rate of regeneration. Welfare is maximized when forest is priced at its

marginal cost and is used until the marginal cost is equal to the marginal benefit. The growth rate of stock should be equal to the discount rate. In the sustainable development (community forestry) the net benefits are positive. According to Pearce, Barbier and Markandya (1990) environmental degradation generates more poverty. Pearce and Turner (1990) noted that common-property and open-access conditions increase the probability of extinction of species.

Public policies usually require inputs to produce other goods or services (Boardman et al. 2006). This might be also the case with the possible REDD-plus or other PES or state subsidy tools in Okongo and Kwandu, where community forests can produce environmental services in the form of climate change mitigation and sustainable forest management. The expenditure on these activities can be financed through taxes or by external project funding. However, governments (especially in developing countries) are often unable to collect sufficient taxes or borrow additional funds. An external forest-based development aid funding such as REDD-plus or other PES-tool (or state subsidy) is needed. In this study these tools were understood to reflect payment for sustainable forest management, which directs community forestry towards a sustainable path.

This present study used a 10-year period. Such a period is conventionally used in forest planning in private forests, and presumably is also suitable for the community forestry planning. At the regional and national levels longer time frames (30 years) are used. Pandit and Chetan (2010) recommend a 20-year time period for NPV calculations in forestry, taking into account different species and maturity periods. An interest rate of 6 per cent was chosen, this percentage is used throughout this study for different natural resource related calculations.

Two scenarios for the Okongo and Kwandu community forests for the time period of 2006–2016 were calculated in this study. In the first scenario the forest area remained as it was in 2006. This option was sustainable forest management. In this scenario community forestry and forest use for home consumption continued. However, deforestation had stopped due to sustainable forest management through the REDD-plus, PES or state subsidy compensation. The second scenario was forest degradation. In this scenario community forestry and forest use for home consumption continued. Moreover, deforestation (0.84 per cent per year of the area) and forest degradation (0.5 per cent per year of the total value) continued. The forest area reduced over the 2006-2016 period. The difference between these two options (calculated per year) was assumed to be paid to the community forest households, as incentive to maintain the forest area as it was in 2006 i.e. no deforestation had occurred.

The opportunity costs and the costs per hectare for the Okongo and Kwandu community forest areas for community forestry and of forest community home consumption in 2006–2016 were calculated. Data received from cost–benefit analysis; benefits, costs and net benefits in 2006 were used in the calculations. This

was converted to the total compensation and the compensation per household to avoid deforestation and forest degradation. Moreover, the value of carbon storages of the Okongo and Kwandu Community Forests were calculated. However, this REDD-plus calculation was intended only for comparison, to ascertain the usefulness and the possibility of having REDD-plus for these communities. The other subsidy methods were regarded to be more usable in the Namibian fragile, low-carbon community forests.

6. DATA

In cost–benefit analysis the reliability of the benefits and costs components data are essential. However, in rural Africa even the existence of basic data on rural industries is often rarity and is especially a challenge at the community level. In this study data were collected from different sources on forestry, agriculture, wildlife and eco-tourism in Okongo Community Forest and Emerging Conservancy and Kwandu Community Forest and Conservancy. Data on the benefits and costs were collected using 1) household surveys, 2) bookkeeping records of earlier forest and conservancy projects, 3) community bookkeeping records and 4) community interviews. These data also formed the basis for defining changes in the household and community level poverty in Okongo and Kwandu communities. These data especially were obtained for community forestry, between the years 2006 and 2008, and aided defining new instruments for sustainable community forestry. The existence of data was verified before choosing the Okongo and Kwandu Communities as study areas. The data of Okongo household survey, earlier forestry and conservancy projects, community bookkeeping records and community interviews were the primary data sources.

Part of the household survey information had to be converted into the metric system. The questionnaire did not have ready-made factors for converting the measurements into the metric system so they had to be created. The household expenditures of the sites[86] were expressed as yearly expenditures. Some agricultural and forestry information[87] was expressed in terms of kilograms. Areas[88] were expressed as hectares. In forestry some volume measurements[89] were converted into cubic metres. The shares of sales[90] were expressed in terms of percentages of production that is 0, 25, 75 and 100 per cent. In forestry the mean tree sizes for Okongo and Kwandu were determined separately since their forests differ slightly from one another. Non-timber forest products output measurements[91] were converted into kilograms. The measurement of grass output[92] was expressed as kilograms or cubic metres. The output of medicinal plants[93] was given as kilograms.

86 1-year, 3-months, 1-month or 2-weeks periods

87 Numbers, kilograms, 25 kg bags, 50 kg bags, 60 kg bags or 35 litre containers.

88 Acres, hectares and square meters.

89 Numbers, bundles, sledges, wheel barrows, donkey carts and pickups (bakkies).

90 None, less than half, more than half and all.

91 Numbers, handfuls, bundles, litres, 20 l tins, cups, 12.5 kg bags, 25 kg bags, 50 kg and kg.

92 Bundles, donkey carts, pickups and sleights.

93 Numbers, handfuls, bundles, litres, 20 litre tins, cups, 12.5 kg bags, 50 kg bag and kg.

6.1 SELECTION OF THE PILOT AREAS AND THEIR DATA COLLECTION

This chapter describes the selection of pilot areas and details the two phases of the data collection, the period 2003–2005 inclusive and 2006–2008 inclusive. It also describes the pilot for the forestry data collection system, which had to provide some specific forestry data for the study and to facilitate the forestry staff in the long-term monitoring of community forestry activities.

In the 2003–2005 period the research project in cooperation with the DOF of the MAWF and the DEA of the MET identified two pilot areas: Okongo Community Forest and Emerging Conservancy and Kwandu Community Forest and Conservancy. The selection criteria for the pilot areas were: 1) available forestry data for the community, 2) an existing project history of the community, 3) a presumed community activity and 4) a situation of ongoing community forest development. Both communities Okongo and Kwandu were among the first community forests gazetted in Namibia. One extra selection criterion in the case of Kwandu was that it was both a community forest and also a conservancy, whereas Okongo was only a community forest. The selection of these two different rural industries for this study was completed in 2006 by first consulting with the forestry, agricultural and wildlife staff of the MAWF and the MET at district, regional and national levels. In addition to community forestry, forestry, agriculture including crop cultivation and animal husbandry, wildlife and eco-tourism were chosen to be the rural industries of the study.

The data were collected in two different phases. The first phase data were collected from the Okongo Community Forest and Emerging Conservancy and Kwandu Community Forests and Conservancy for the 2003–2005 time period, when the communities had not yet obtained legal rights to generate income from their forest resources. However, the communities could use their forest resources solely for their home consumption. The data were gathered from the community bookkeeping resources, forestry and conservancy project bookkeepings, unpublished and published reports such as the National Forest Accounts and other statistics. The second phase data were collected from the Pilot Communities, from household survey information, community bookkeeping, and unpublished and published reports from the time period when the communities had legal rights to generate income from their forest resources (after a gazettement in 2006) for the years 2006–2008. Originally the research project aimed to collect specific community forest data from Okongo and Kwandu. This was planned to be done with the cooperation of the DOF through the pilot of community forest data collection system in Okongo and Kwandu. The purpose of this community forest data was to complete the household survey data. The data collection pilot started on 1 April

2006 and ended on 31 March 2009. Data were collected by Okongo and Kwandu communities, the DOF and the research project itself.

The original data collection forms were developed by the DOF in 2005 for consultancy work of a forestry project. However, these field collection forms were only in English and they were too extensive for the community level use. That is why the development work of data collection forms continued in 2006, and new preliminary forms were developed by members of Okongo's and Kwandu's FMC and by the Directorate of Forestry's staff at district, regional and head quarter levels. This research project itself was also involved in this development work in the field. The preliminary forms consisted of daily, monthly and annual forms, and they were intended to be for collecting information on commercial production and sales of forest products and other forest activities.

It was assumed that in the second year of the pilot (1 April 2007 – 31 March 2008) the data collection forms would already have been translated into the local languages and the data collection recording be underway. The forestry data collection system was planned to be a part of normal daily routines in the Okongo and Kwandu Community Forests in the budget year of 2008/2009. However, this assumption did not materialize. The research project made two monitoring trips to Okongo and Kwandu with the DOF staff, one in September 2007 and another in May 2009.

In September 2007 the forest activity recording was underway in Kwandu. The same forestry information was also double recorded into the normal community forest and conservancy bookkeeping by the community. However, in Okongo the forestry data collection system was still in its initial phase. The Okongo community was also recording the forestry information into the normal community bookkeeping records. During the second monitoring field trip in May 2009 it was noticed that the data collection system was still in its initial phase in Okongo. However, the Okongo Community FMC was continuing to record the forestry activities into the community bookkeeping. In Kwandu, the forest data collection forms were only partially in use. In addition the Kwandu Community Forest had started to record their forest permits into a booklet developed by a forest project at the district level in 2009. The community also continued to record their forestry activities in the normal community bookkeeping.

All in all, the piloting of the data collection system did not provide the required forestry data for the study. However, the research project managed to get the required forest data from the other community records that existed namely from community forest and from conservancy bookkeeping records. These datasets were completed by the community interviews in May 2009.

6.2 OKONGO AND KWANDU HOUSEHOLD SURVEYS

Household surveys of Kwandu in 2006 and Okongo in 2007 (a principal dataset) are explained in this section 6.2. The data sampling method is described under heading 6.2.1. Household survey data, household income sources, household assets and agricultural and forestry production are explained under heading 6.2.2.

The Okongo (2007) and Kwandu (2006) Household Surveys provided fundamental information on the socio-economic status of households residing in Okongo Community Forest and Emerging Conservancy and Kwandu Community Forest and Conservancy sites. This information was the basis of the cost–benefit analyses used in this study. In Tables 6.2–6.22 the Okongo household survey data are the primary data of the survey.

The Household Surveys provided basic data on 1) household details, 2) household assets, 3) household access to facilities, 4) damage caused by wild animals, 5) household expenditure, 6) livestock and poultry ownership, 7) livestock production, 8) crop production, 9) crop destruction, 10) natural resources[94], 11) resource use in the area, 12) household participation in community based natural resource management (CBNRM), 13) participation in conservancy activities and 14) household benefits from conservancy.

The Kwandu Conservancy was one of the survey conservancies of the ICEMA Project (the Integrated Community-Based Ecosystem Management) in the MET in 2006. This baseline quantitative survey was carried out in two regions and 10 communities of which eight were conservancies and two were non-conservancies.[95] A detailed questionnaire of the survey was made in close cooperation with World Bank economists who had also assisted in a large socio-economic household survey for CBNRM in 2001. The survey was carried out by the MET as a part of the Wildlife Integration for Livelihood Diversification Project (WILD). These two surveys in 2001 and 2006 followed the same or a very similar format. In 2006 the field work was carried out by the Social Impact Assessment and Policy Analysis Corporation Company (SIAPAC), which is based in Windhoek. Enumerators were selected and trained according to the language requirements and field work skills.

An Okongo Household Survey was carried out in November 2007, which was a continuation of the earlier 2006 survey. The method was exactly the same as in the 2006 survey and the field work was also done by SIAPAC. The Okongo survey was funded by the Directorate of Forestry, German Development Corporation (DED),

94 Wood resources, fish, wild foods, medicinal plants and non-timber forest products.

95 The other survey communities were Torra, #Khoadi-//Hôas, Ehirovapuka, Purros and Epupa (which was not at the time a conservancy) in Kunene, and Salambala, Mayuni, Kasika and Kabilualua (which was not at the time a conservancy) in Caprivi.

the Rössing Foundation, Namibia Nature Foundation (NNF), and the Academy of Finland through this research project.

The Okongo and Kwandu surveys used the same survey method, which enabled the later comparison with the other communities of the 2006 survey. Only the local languages created an additional requirement in the field work[96]. The difference in the completion time of the surveys (one was carried out in June 2006 and the other in November 2007) was discussed thoroughly with each party, including the World Bank's Environment Department, which was involved in the original questionnaire design. The various sources of statistics showed that there were insignificant changes in Ohangwena and Caprivi Regions between the years 2006 and 2007[97]. It was notable that in February 2006, the Okongo and Kwandu communities were granted the legal rights to use all forest revenue for their own benefit. However, the real wood trade activities started later, at the end of 2007 in Okongo and in 2009 in Kwandu. The two household surveys can be considered to be comparable because of these events, though the surveys were not carried out exactly at the same time. The basic household data of Okongo and Kwandu are shown in the cost–benefit tables for the year 2006, which is regarded as the base year of the study.

6.2.1 DATA SAMPLING IN HOUSEHOLD SURVEYS

The data sampling is a process where by a sample population is drawn and compiled. In Okongo and Kwandu the Probability Proportionate to Size (PPS) sample was drawn from the households in the field within the emerging conservancy/ conservancy area in the field. Each household had an equal opportunity to appear in the sample. In Kwandu a Conservancy Map was used, which included all the villages and members that are part/members of the conservancy. In Kwandu, five clusters were chosen. In Okongo the Community Forest Map was used, which included only the forest area (SIAPAC 2007b). However, all households did not belong to the forest area in the Okongo Community Forest. Consequently, two more Primary Sampling Units (PSUs) were added to the west of the forest area to give a better representation of people who belong to the community forest/ emerging conservancy (Table 6.1). The PSU maps were provided by the Central Bureau of Statistics and originated from the 2001 Census Data. After determining the total number of households, the PSUs were defined and the PSU boundaries were established by the respective household survey team together with the community forest and conservancy members and village leaders. The field work was carried out

96 Oshiwambo was used in Okongo and SiLozi in Kwandu in the interviews.

97 Central Bureau of Statistics and Ministry of Agriculture, Water and Forestry e.g. Agricultural Bulletins.

by enumerators who spoke the relevant local language. The field teams consisted of one Field Supervisor, four Enumerators and one Field Survey Co-ordinator.

Table 6.1 Primary Sampling Units in Okongo 2007.

Primary Sampling Unit	Number of interviews	Name of village
PSU 80699031	14	Oshalande, Odavema, Omauni Manini
PSU 80699032	28	Omauni Manini, Omauni Makula, Ombumbuma
PSU 80699033	28	Onghwiyu, Olukula
PSU 80699034	28	Okatope, Ohiki, Okanyandi, Oshikona, Omwandi
PSU 80699035	7	Omwoomde, Omadiva
Total	105	

The total sample in Okongo included 238 households on communal land and 137 households on settlement (SIAPAC 2007b). The interview was conducted in 105 households with two additional interviews in the community level according to the Quantitative Questionnaire (Table 6.1). One of households belonged to the most marginalized group in Namibia, the San. The community interviews were conducted in Omauni Macula (emerging conservancy) and Omauni Manini (forestry). The received Okongo data was a primary data.

The Kwandu villages were small in size and widely dispersed geographically. In Kwandu, 80 household level interviews, five community level interviews with village headmen and one community level interview with conservancy and community forest committee members were carried out. The analysed Kwandu data consisted of 82 household level and one community level interviews. The data were transferred to SPSS (Statistical Package for the Social Sciences) and later to Data Analysis STATA10 Statistical Software, which was used for the analysis. In Okongo Community Forest and Emerging Conservancy the survey covered 105 households out of 229 (46 % coverage) and in Kwandu Community Forest and Conservancy 82 households out of 210 (39 % coverage).

6.2.2 DESCRIPTION OF PRIMARY DATA OF OKONGO AND SECONDARY DATA OF KWANDU

The detailed Okongo and Kwandu Household Surveys, which included a total of 1 126 variables, provided the basic information on Okongo (primary data) and Kwandu (secondary data). The information categories used for the study were: 1) age of household head and size of family, 2) household assets, 3) household expenditures, 4) agricultural production, 5) forest production, and 6) share of agricultural and forest revenues. The results are presented under headings 6.2.2.1–6.2.2.6.

6.2.2.1 Age of household head and size of family in Okongo and Kwandu

The mean age of a household head was almost the same in Okongo and in Kwandu (Table 6.2). According to the household survey households were smaller in Okongo (4.8) than in Kwandu (5.7). In contrast the 2001 Census mean Okongo household had 6.4 persons whereas in Kwandu it was only 4.8 persons. In the study the official 2001 census figures on household size, which also are used as a basis of the Namibian poverty line calculations, were used in poverty calculations of basic need approach in order to make the comparison possible.

Table 6.2 Mean household head age and number of persons in households in Okongo and Kwandu in 2006.

Household survey	**Mean**		**Max**		**Min**		**Std. Dev.**	
	Okongo	Kwandu	Okongo	Kwandu	Okongo	Kwandu	Okongo	Kwandu
Household head age	48	47	87	97	20	22	16.6	17.5
Person per household	4.8	5.7	22	12	2	2	3.8	2.6

In the Okongo site, household heads were mostly men whereas in Kwandu only a half of them were (Table 6.3). A fairly high number of women headed households in Kwandu gave some indications of increased vulnerability to poverty. In Namibia women headed households in rural areas are generally regarded to be more vulnerable to poverty than men headed households. Levinen and Robers (2008) came to the same conclusion in their study.

Table 6.3 Sex of household head in Okongo and Kwandu in 2006.

Household survey	**Okongo**		**Kwandu**	
Sex of household head	Number of households	%	Number of households	%
Men	91	87	47	57
Women	14	13	35	43
Total	105	100	82	100

In Okongo, salary and pension are the most important income sources when agricultural or forestry returns are not taken into account (Table 6.4). In the women headed households, which represent 13 per cent of all households in Okongo, salaries and pensions were even more important income sources.

Table 6.4 Percentages of different income sources in households (excluding agriculture and forestry) in Okongo and Kwandu in 2006.

Household survey	Okongo				Kwandu			
Income source (excluding agriculture and forestry)	Households	%	Okongo women headed households	%	Households	%	Kwandu women headed households	%
Gifts	19	18	n/a	n/a	26	32	n/a	n/a
Salary	35	34	43	41	13	16	n/a	n/a
Business	13	12	n/a	n/a	13	16	n/a	n/a
Pension	32	30	36	34	10	12	31	38
None	6	6	n/a	n/a	20	24	34	41
Total	105	100			82	100		

In Kwandu the share of gifts[98] formed one third of the household income (Table 6.4). About one fourth of all households did not have any revenue source. The only revenues in these households might have been obtained from subsistence agriculture or forestry, which give some indications about the vulnerability to poverty. In the women headed households, which constituted nearly a half of the households in Kwandu, about one half did not have any revenue source.

6.2.2.2 Household assets in Okongo and Kwandu

Household assets can be divided into fixed assets[99] and livestock assets. Livestock assets can be divided into three categories: fixed (draft animals), intermediate (production animals) and current (income/sale) (Sydney and Phillip 2000).

According to the Okongo and Kwandu household surveys, Kwandu's household asset values were much lower than those in Okongo. Kwandu's mean fixed asset value was only one tenth (15 per cent) of that in Okongo, and the difference was even bigger among the women headed households. However, most households in both communities had only the basic hand tools, axe and hoe[100]. In Okongo, the average fixed household asset value was N$33 589, which included N$17 616 as draft animals (Tables 6.5 and 6.6). In Kwandu the mean fixed household asset value was only N$5 045, which included draft animals with a value of N$867. In the women headed households in Okongo, the fixed household asset value (Table 6.5) was only one third (35 %) of that of men-headed households. At the same time the asset value of female headed households in Kwandu was only one tenth (13 %) of that of male headed households.

98 A support from relatives or family members who work and live outside the household and frequently send money to the household.

99 Include draft animals as well.

100 In Okongo plough (83 per cent of households) and oxen (77 per cent of households) were common but in Kwandu only one third of households had them.

Table 6.5 Value of fixed household assets in Okongo and Kwandu per household in 2006, N$.) (Euro1 = N$10)

Household assets, including draft animals, N$	All households, Mean	Max	Min	Std. Dev.	Women headed households, Mean	Men headed households, Mean
Okongo	33 589	404 670	0	60 495	12 914	36 770
Kwandu	5 045	217 675	0	24 836	1 027	8 038

In Okongo nearly all households had draft oxen, a mean of six oxen with a total value of N$13 266 per household, and donkeys and horses. The total value of draft animals per household in Okongo was N$17 617. (Table 6.6). Only one third of households in Kwandu had oxen for draft purposes. None of the households had horses and only a few households had donkeys. The total value of draft animals per household in Kwandu was N$867. Teweldmehidin and Conroy (2010) stated that Caprivi Region has the highest draft oxen population in Namibia. However, the household survey showed that in Kwandu community the draft animal numbers are low.

Table 6.6 Draft animals in Okongo and Kwandu in fixed household assets in 2006, N$. (Euro1 = N$10)

Household survey	Price, N$		Number in household survey		Total, N$, in household survey		N$/household	
Draft animals	Okongo	Kwandu	Okongo	Kwandu	Okongo, 105 households	Kwandu, 82 households	Okongo	Kwandu
Oxen	2 377	2 733	586	24	1 392 922	66 592	13 266	800
Donkeys	933	2 750	286	2	266 838	5 500	2 541	67
Horses	2 604		73	0	190 092	0	1 810	0
Total					1 849 852	72 092	17 617	867

At 5 per cent of that in Okongo, the value of draft animals per household was much lower in Kwandu. The main reason for this might be that Okongo is a livestock area where nearly all households cultivate millet and consequently draft animals have a high value. In contrast, Kwandu has few cattle, poorer households and it is also a wildlife area.

In intermediate livestock assets (production animals) the livestock numbers were high in Okongo[101]. The total value of livestock per household in Okongo was N$150 620. The composition of a herd and the size of an animal were taken into account when the mean prices were defined (Table 6.7).

101 About 80 per cent of households had cattle. More than a half of households (55 %) had goats. Nearly all (79 %) households had poultry.

Table 6.7 Production animals in Okongo and Kwandu as intermediate assets in 2006, N$. (Euro1 = N$10)

Household survey	Number per household		Price, N$		Total value per household, N$	
Production	Okongo	Kwandu	Okongo	Kwandu	Okongo	Kwandu
Cattle	60	2	2 407	1 288	144 420	2 576
Goats	20	2	285	283	5 700	566
Sheep	0	0	285	0	0	0
Pig	0	0	500	0	0	0
Poultry	25	5	20	20	500	100
Horses	0		500	0	0	0
Donkeys	0		700	0	0	0
Total					150 620	3 342

Kwandu's intermediate livestock assets were much lower than Okongo's.[102] The total value of livestock per household in Kwandu was N$3 342. Kwandu's intermediate livestock value was only 2.2 per cent that of Okongo. When the same Okongo and Kwandu intermediate livestock assets were calculated using the common Namibian livestock prices in 2006, intermediate livestock asset value in Kwandu at N$5 048 was still only 2.5 per cent of that in Okongo N$199 353. The difference between Okongo and Kwandu was more prominent for actual numbers of livestock than it was for prices.

In Okongo, where livestock numbers per household were high, proportional livestock sales did not occur. Livestock sales in Okongo and Kwandu are presented in Table 6.8. The livestock sales per household in Okongo were N$1 526, which mostly consisted of cattle (92 %) and in Kwandu N$198, which also consisted mostly of cattle (73 %). The livestock sales per household in Kwandu were only one tenth (13 %) of those in Okongo, and mostly accrued from live cattle sales. These values are in proportion to the livestock numbers in the respective communities. In Okongo and Kwandu, only one in ten of households sold live or slaughter livestock and the prices of slaughter animals were lower than prices of live animals. This is in accordance with the study of Teweldmehidin and Conroy (2010). According to those authors the purchase price of a live ox in Caprivi was N$2 500 and of a slaughtered ox N$1 333. The off-take was low, only one per cent in Okongo and six per cent in Kwandu. The Okongo households especially could get much more livestock revenue if the off-take was higher.

102 In Kwandu nearly a half of households (44 %) had cows. About one tenth (11 %) of households had goats. A little more than a half of households (56 %) had poultry.

Table 6.8 Mean value of annual livestock sales per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Household survey	Sold/bartered, n		N$ per household		Sold/slaughters, n		N$ per household		Total value per household, N$	
Sales	Okongo	Kwandu	Okongo	Kwandu	Okongo	Kwandu	Okongo	Kwandu	Okongo	Kwandu
Cattle	0.5	0.1	1 245	139	0.1	0	153	5	1 398	144
Goats	0.3	0.3	90	38	0.06	0	0	1	90	39
Sheep	0.04	0	0	0	0	0	0	0	0	0
Poultry	0.7	0	20	0	0.5	0	7	0	27	0
Pigs	0	0.6	0	11	0	0.2	5	4	5	15
Horses	0	0	1	0	0	0	0	0	1	0
Donkeys	0	0	0	0	0.02	0	5	0	5	0
Total			1 356	188			170	10	1 526	198

Generally, Okongo is much more livestock oriented than Kwandu.[103] Moreover, goat and poultry numbers are much lower in Kwandu than in Okongo. This difference could partly be explained by cultural differences. The Owambo culture in Okongo is much more livestock oriented than the SiLozi culture in Kwandu. In Kwandu the wildlife has also to be taken into account in livestock production and grazing. The quality of household survey data should be considered in both communities, especially in Kwandu. However, the Kwandu results are quite similar to the three other Caprivi communities in the 2006 household survey. This supports the concept of the data validity in Kwandu. Numerous herds of cattle are visible everywhere in Okongo but not to the same extent in Kwandu.

The total average asset value per household was N$184 209 in Okongo and N$8 387 in Kwandu. Kwandu's total household asset value was only 4.6 per cent of that in Okongo. In Okongo 6 per cent of the households[104], but in Kwandu half of the households (54 %) had a very low asset value.

6.2.2.3 Household expenditures in Okongo and Kwandu

According to Ravallion (2007) calculating total household expenditure require that the annual values of food expenses, farm production, home consumption value of non-farm outputs consumed domestically, expenditures on education, non-food purchases, remittances and wages in-kind are all taken into account. In a developing economy (such as in Okongo and Kwandu) food production tends to be poor and there is a high budget share on food.

103 In Okongo nearly all households have cattle and cattle numbers are high, whereas in Kwandu less than a half ofthe households have cattle and even then only a few heads per household.

104 Less than the value of the upper bound of poverty line: N$262.45.

In the comparison of household expenditures in Okongo and Kwandu was be noted that the mean food expenditure in Okongo was 2.5 times of that in Kwandu, and the difference was even bigger when calculated per person (Table 6.9). However, Kwandu's food expenditure was almost at the same level as in the three other Caprivi communities that were included in the 2006 ICEMA-survey. The other expenditure was one third lower in Okongo than in Kwandu, when calculated per person. When other expenditure in Kwandu were compared to the other three Caprivi communities, it turned out to be lower.

Table 6.9 Mean household expenditures in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Household survey	Mean		Max		Min		Std. Dev.	
Expenditures	**Okongo**	**Kwandu**	**Okongo**	**Kwandu**	**Okongo**	**Kwandu**	**Okongo**	**Kwandu**
Food exp.	11 283	4 462	110 960	45 962	0	0	18 587	6 425
Food exp. per person	2 355	787	25 541	4 178	0	0	4 460	886
Other exp.	4 791	7 320	38 624	83 320	12	95	6 209	12 496
Other exp. per person	1 000	1 291	10 156	8 332	3	16	1 821	1 408
Total exp.	16 074	11 782	123 416	102 698	24	108	21 374	17 405
Total exp. per person	3 356	2 078	28 655	10 270	6	54	5 508	1 996

The total expenditure in Okongo was one third higher than in Kwandu and even higher when calculated per person. In both communities the food expenditure per household correlated well with the total expenditure. The respective Pearson correlations were 0.957074 for Okongo and for Kwandu 0.838312.

6.2.2.4 Agricultural production in Okongo and Kwandu

In 2006 total agricultural revenue in the Kwandu households was only 14 per cent of that in Okongo (Table 6.10). The home consumption accounted for a major part (87 %) of the total agricultural revenue per household in Okongo but was less in Kwandu (75 %).[105] When Kwandu was compared to the other three Caprivi communities of the ICEMA household survey it appeared that the value of agricultural home consumption of Kwandu was 40 per cent and the agricultural sale one fifth (22 %) of the other Caprivi communities. The total agricultural revenue per household was 43 per cent in Kwandu of that (N$4 091) in the other three Caprivi communities. The agricultural production was N$52 per hectare in Okongo.

105 In Kwandu the sales were 25 per cent of the total agricultural revenue compared with 13 per cent in Okongo.

Table 6.10 Agricultural revenue per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Agriculture	Home consumption, N$				Sale, N$				Total value, N$			
Revenues	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Vegetables	118	98	135	89	2	2	16	11	121	1	152	9
Fruits	29	100	0	0	0	0	0	0	29	0	0	0
Cereals	9 236	99	1 017	87	55	1	152	13	9 291	72	1 169	66
Livestock	1 814	54	166	46	1 526	46	198	56	3 340	26	364	20
Other farm.	0	0	0	0	41	100	79	100	41	1	79	5
Total	**11 198**		**1 318**		**1 625**		**445**		**12 822**	100	**1 764**	100

In Okongo cereal production was a major part of the total agricultural revenue of households and 99 per cent of it was for home consumption (Table 6.10). Most of the Okongo households (85 %) grew pearl millet, 66 per cent maize and 64 per cent sorghum. Livestock production formed one third of the total agricultural revenue per household. In Kwandu the cereal production was also the most important agricultural revenue accounting for two thirds of production, and 87 per cent of it was for home consumption. In Kwandu, 56 per cent of the households grew maize, 24 per cent millet and 18 per cent sorghum. Livestock accounted for 20 per cent of agricultural revenue in Kwandu. Nearly a half (43 %) of the livestock revenue came from poultry. The total agricultural production in Kwandu was N$19 per hectare.

Nearly all the agricultural costs (98 %) of households in Okongo were incurred by crop production which was similar to that of (94 per cent) for Kwandu. Mostly they were related to home consumption, due to the high labour demand of crop production (Table 6.11).

Table 6.11 Agricultural costs per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Agriculture	Home consumption, N$				Sale, N$				Total value, N$			
Costs	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Vegetables	22	88	28	82	3	12	6	18	25	0	34	1
Fruits	20	100	0	0	0	0	0	0	20	0	0	0
Cereals	18 259	99	2 405	87	180	1	360	13	18 439	98	2 765	94
Livestock	264	70	38	51	111	30	36	49	375	2	74	2
Other farm.	0	0	0	0	41	100	79	100	41	0	79	3
Total	**18 565**		**2 471**		**335**		**481**		**18 900**		**2 952**	

In this study the cost of agricultural work was assumed to be equal to the cost of the national farm worker's salary (excluding food and housing allowances), and the agricultural work was expected to be carried out by the households. No taxes were paid on the production or for the salaries.

6.2.2.5 Forest production in Okongo and Kwandu

Forest production includes wood products, non-wood products and medicinal plants. In Okongo two thirds of the household forest revenue comprised wood products, for their home consumption. In Okongo, medicinal plants and non-wood forest products had some role in the revenue formation at the household level (Table 6.12). In Kwandu two thirds of the forest revenue came from medicinal plants, with about one tenth of from actual sales. In Okongo the total forestry revenue per household was nearly double that of Kwandu.

Table 6.12 Forestry revenue per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Forestry	Home consumption, N$				Sale, N$				Total value, N$			
Revenues	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Wood products	2 906	99	554	99	30	1	6	4	2 936	68	560	22
Non-wood forest prod.	422	93	269	90	34	7	30	10	456	11	299	12
Medicinal plants	892	100	1 541	93	0	0	110	7	892	21	1 651	66
Total	**4 221**		**2 363**		**64**		**146**		**4 291**		**2 510**	

In Okongo, most forestry costs were attributed to wood products and nearly all of them for their home consumption (Table 6.13). Moreover, most forestry costs (71 %) in Kwandu due to home consumption of wood products. The non-wood forest products formed one quarter of forestry costs in Okongo.

Table 6.13 Forestry costs per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Forestry	Home consumption, N$				Sale, N$				Total value, N$			
Costs	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Wood products	1 475	98	517	95	18	2	25	5	1 493	95	542	71
Non-wood forest prod.	58	86	189	90	9	14	2	10	67	4	211	28
Medicinal plants	7	100	8	89	0	0	1	11	7	1	9	1
Total	**1 540**		**714**		**27**		**48**		**1 567**		**762**	

In Okongo households, the wood product revenue mainly came from the home consumption of firewood and thin poles. In the Kwandu households, wood products revenue mainly consisted of home consumption of firewood. The sale of wood products played only a minor role at the household level in both Okongo and Kwandu (Table 6.14). In Okongo the total wood products revenue per household was five times higher that of Kwandu.

Table 6.14 Wood product revenue per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Wood products	Home consumption, N$				Sale, N$				Total value, N$			
Revenues	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Timber	32	89	0	0	4	11	1	100	36	1	1	1
Poles	529	100	42	100	0	0	0	0	529	18	42	7
Thin poles	1 061	100	18	95	0	0	1	5	1 061	36	19	3
Firewood	1 272	98	494	99	20	2	4	1	1 292	44	498	89
Craft material	13	68	0	0	6	32	1	100	19	1	1	0
Total	**2 907**		**554**		**30**		**6**		**2 937**	**100**	**560**	**100**

In Okongo most of the wood product costs came from the firewood collection for home consumption (Table 6.15). Furthermore, the home consumption of poles and thin poles incurred some of the costs. In Kwandu nearly all of the wood product costs came from the firewood collection for home consumption.

Table 6.15 Wood product costs per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Wood products	Home consumption, N$				Sale, N$				Total value, N$			
Costs	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Timber	32	91	0	0	3	9	0.4	100	35	2	0.4	0
Poles	387	100	25	100	0	0	0	0	387	26	25	5
Thin poles	354	100	4	80	0	0	0.6	20	354	24	5	1
Firewood	693	98	488	95	11	2	24	5	704	47	512	94
Craft material	9	69	0	0	4	31	0.5	100	13	1	0.5	0
Total	**1 475**		**517**		**18**		**26**		**1 493**	100	**543**	100

In Okongo the largest revenue of non-wood forest products came from green leaves, which could also be grouped into agricultural revenue, because a major part of them were cassava leaves. Wild fruits, which are often used for the production of the local gin and wild honey were also important non-wood products in Okongo. In Kwandu thatch grass was the most important revenue source in non-wood production. The collection of reeds was important (Table 6.16).

Table 6.16 Non-wood forest product revenue per household in Okongo and Kwandu in 2006, N$. (Euro 1 = N$10)

	Home consumption, N$				Sale, N$				Total value, N$			
Non-wood	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Green leaves	157	96	24	86	7	4	4	14	164	35	28	9
Roots	7	100	0.5	0	0	0	0	0	7	2	0.5	0
Edible ants	0	0	3	100	0	0	0	0	0	0	3	1
Wild fruits	90	94	33	94	6	6	2	6	96	21	35	12
Wild honey	156	100	0.5	0	0	0	0	0	156	34	0.5	0
Mushrooms	8	89	0	0	1	11	0	0	9	2	0	0
Reeds	0	0	66	86	0	0	11	14	0	0	77	26
Palm leaves	4	100	4	100	0	0	0	0	4	0	4	1
Thatch grass	0	31	138	91	21	69	14	9	21	6	152	51
Total	**422**		**269**		**35**		**31**		**457**	100	**300**	100

In Okongo nearly a half of non-wood forest product costs were attributed to the collection of wild honey, green leaves, wild fruits, which were mostly for home consumption. Thatch grass collection which was for sale accounted for one tenth of the costs (Table 6.17). In Kwandu, two thirds of costs could be attributed to thatch grass. The collection of reeds incurred one fourth of the cost, of which about one tenth was from sales.

Table 6.17 Non-wood forest product costs per households in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

	Home consumption, N$				Sale, N$				Total value, N$			
Non-wood	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**	**Okongo**	**%**	**Kwandu**	**%**
Green leaves	12	92	9	90	0.5	8	1	10	13	19	10	5
Roots	1	100	0	0	0	0	0	0	1	1	0	0
Edible ants	0	0	2	100	0	0	0	0	0	0	2	1
Wild fruits	9	90	2	100	0.6	10	0	0	10	15	2	1
Wild honey	29	100	0	0	0	0	0	0	29	43	0	0
Mushrooms	6	100	0	0	0.4	0	0	0	6	9	0	0
Reeds	0	0	46	85	0	0	8	15	0	0	54	26
Palm leaves	0.5	100	2	100	0	0	0	0	0.5	1	2	1
Thatch grass	0	0	128	91	8	100	13	9	8	12	141	66
Total	**58**		**189**		**9**		**27**		**67**	100	**211**	100

In Okongo the gathering of medicinal plants and their preparation was for consumption in the home (Table 6.18). The medicinal plants are used for traditional medical treatments. The gathering and sale of medicinal plants was more important in Kwandu than in Okongo. The nearness of Zambia and its herb markets have a positive impact on Kwandu's revenue generation and traditional medicine is commonly practised in the area. In Kwandu especially, the 'Devil' claw' plant brought in revenues for the households.

Table 6.18 Medicinal plant product revenues per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Medicinal plants	Home consumption, N$				Sale, N$				Total value, N$			
	Okongo	%	Kwandu	%	Okongo	%	Kwandu	%	Okongo	%	Kwandu	%
Medicinal barks	5	100	581	94	0	0	36	6	5	1	617	37
Medicinal leaves	462	100	415	92	0	0	37	8	462	52	452	28
Medicinal roots	425	100	544	94	0	0	37	6	425	47	581	35
Medicinal stem	0	0	1	100	0	0	0	0	0	0	1	0
Med. whole plant	0	0	0	0	0	0	0	0	0	0	0	0
Total	**892**		**1 541**		**0**		**110**		**892**	100	**1 651**	100

The medicinal plant gathering costs per household in Okongo and Kwandu were low compared to the high value of medicinal plants sold on the market (Table 6.19).

Table 6.19 Medicinal plant product costs per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

Medicinal plants	Home consumption, N$				Sale, N$				Total value, N$			
	Okongo	%	Kwandu	%	Okongo	%	Kwandu	%	Okongo	%	Kwandu	%
Medicinal barks	0	0	3	36	0	0	0.2	2	0	0	3	38
Medicinal leaves	1	100	1	12	0	0	0	0	1	14	1	12
Medicinal roots	6	100	4	48	0	0	0.3	2	6	86	4	50
Medicinal stem	0	0	0.3	0	0	0	0	0	0	0	0.3	0
Med. whole plant	0	0	0	0	0	0	0	0	0	0	0	0
Total	**7**		**8.3**		**0**		**0.5**		**7**	100	**8**	100

When comparing household level forest revenues of Okongo and Kwandu (Table 6.12), the total forest revenue per household of Okongo was marginally more than double compared that of Kwandu. However, the annual forest product sale per household in Kwandu was more than double that of Okongo. This supports the Byron and Arnold's (1999) theory that the poor draw some revenue from nearby forests (See p. 23). When comparing Kwandu to the other ICEMA communities in Caprivi, the shares of the total forest revenue and the forest home consumption were almost the same. However, the sale of forest products in Kwandu was only a half of that for the three Caprivi communities. One reason for this could be the distance to the markets. Kwandu is one of the farthermost communities in Caprivi and the other three communities are much closer to the markets and the regional centre.

In Okongo and Kwandu the forest work is mostly done manually using the axe and saw. The means of forest transport is the donkeys. Both community forests have some basic forest tools and equipment (sledges or donkey carts) to facilitate the forest transport. Some hired forest entrepreneurs have also used chain saws in carrying out forest work and as a tool for sawmilling in Okongo. In this study, forest labour is taken to be at the same level as the agricultural labour in subsistence agriculture. However, the salary of hired forest workers can be more than double,

N$50/day, especially for sawing. In this study, it was presumed that the forest work was carried out using hand tools and by the households themselves. No taxes were paid for this work.

6.2.2.6 Shares of agricultural and forest revenues in Okongo and Kwandu

When the relative components of agricultural, forestry and community group activity revenues were compared for Okongo, the share of agriculture comprised the major part (Table 6.20).[106] Agriculture also formed the major part of home consumption and sales in Okongo. The share of forestry was 25 per cent.

Table 6.20 Agriculture and forestry revenues per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

	Home consumption, N$		%		Sale, N$		%		Total value, N$		%	
Revenues	**Okongo**	**Kwandu**	**O**	**K**	**Okongo**	**Kwandu**	**O**	**K**	**Okongo**	**Kwandu**	**O**	**K**
Agriculture	11 198	1 319	73	36	1 625	445	69	67	12 822	1 764	75	41
Forestry	4 221	2 363	27	64	64	147	23	23	4 284	2 510	25	58
Group activ.	0	0	0	0	58	52	8	10	58	52	0	1
Total	**15 425**	**3 682**			**1 716**	**644**			**17 140**	**4 326**	100	100

In Kwandu two thirds of the revenues of agriculture, forestry and community group activities came from forestry and most of them from home consumption. The share of agriculture was 41 per cent (Table 6.20). When the household revenues in agriculture and forestry of Okongo and Kwandu were compared, the total agricultural revenue of Kwandu was only 14 per cent, agricultural sales 27 per cent and agricultural home consumption 12 per cent of their equivalent in Okongo. The total forest revenue per household in Kwandu was a little more than a half of that in Okongo. The share of forestry sale was bigger, but the forest home consumption was only one half. The total agricultural and forestry revenue in Kwandu was 25 per cent that of Okongo. One reason for this difference might be the higher number of severely poor households in Kwandu. These households did not have enough assets for production. One explanation could be that agriculture and forestry were not as important in Kwandu as in Okongo. Table 6.21 presents agricultural and forestry costs per household in Okongo and Kwandu for 2006.

106 Other income: gifts, salary, business and pensions were excluded.

Table 6.21 Agriculture and forestry costs per household in Okongo and Kwandu in 2006, N$. (Euro1 = N$10)

	Home consumption, N$		%		Sale, N$		%		Total value, N$		%	
Costs	**Okongo**	**Kwandu**	**O**	**K**	**Okongo**	**Kwandu**	**O**	**K**	**Okongo**	**Kwandu**	**O**	**K**
Agriculture	18 565	2 471	92	78	335	482	82	83	18 900	2 953	92	78
Forestry	1 540	714	8	22	27	48	7	8	1 567	762	8	21
Other	0	0	0		44	50	11	9	44	50	0	1
Total	**20 105**	**3 185**			**406**	**580**			**20 511**	**3 765**	100	100

The costs in Okongo consisted mostly of the home consumption of agricultural produce. In Kwandu, forestry formed one fifth of the costs. Table 6.22 presents the benefits and costs for agriculture, forestry and other community activities per household in 2006 in Okongo and Kwandu, based on the household surveys. This year was the base year for discounting and calculating net benefits for 2003–2008.

Table 6.22 Benefits and costs of agriculture, forestry and other community activities per household in Okongo (229 households) and Kwandu (210 households) in 2006. (Euro1 = N$10)

Okongo and Kwandu	**Benefits, N$**				**Costs, N$**			
Per household	**Home consumption**		**Sale**		**Home consumption**		**Sale**	
Agriculture	**Okongo**	**Kwandu**	**Okongo**	**Kwandu**	**Okongo**	**Kwandu**	**Okongo**	**Kwandu**
Vegetables	118	135	2	16	22	28	3	7
Fruits	29	0.2	0	0	20	0	0	0
Cereals	9 236	1 017	55	152	18 259	2 405	180	360
Livestock	1 814	166	1 526	198	264	38	111	36
Other farm revenue	0	0	41	79	0	0	41	79
Forestry								
Wood products	2 906	554	30	7	1 475	517	18	25
Non-wood product	422	269	34	31	58	189	9	22
Medicinal plants	892	1 541	0	110	7	8	0	0.5
Other community activity	0		57	52	0	0	44	50

6.3 BOOKKEEPING RECORDS OF EARLIER PROJECTS USED AS THE BASIS OF NEW COMMUNITY ACTIVITIES IN OKONGO AND KWANDU

The primary data, which were obtained from bookkeeping records of earlier forestry and conservancy projects, are described in this section. In Okongo the additional forestry data were obtained from the bookkeeping of the 1998–2006 forestry programme and in Kwandu from the bookkeeping of the forestry programme of the 2001–2005 period and the conservancy programme for the 1999–2005 period.

The Okongo Community had a forestry programme called the 'Sustainable Management of Indigenous Forests' in 1998–2006. The total investment was N$7 759 897, about N$33 886 per household (Annex 1), which was for forestry activities (Table 6.23). The Okongo Forest Project targeted revenue generation and diversification of revenue sources in the community, for example. The project supported the trials of guinea fowl farming, millet grinding and carpentry. Since 2007 the Okongo Community Forest has financed its own forest activities and started selling timber. The community is also promoting a conservancy initiative on 19 649 hectares. The depreciation value of investments in buildings which includes a meeting hall, a community tourist camp site with a dining area, accommodation with a toilet building and sundry equipment was N$291 005 in 2006 monetary value. The amortization time for the equipment mainly comprising hand tools was four years, for vehicles it was 10 years and for buildings it was 40 years.

Table 6.23 Earlier project investments in Okongo and Kwandu in the 1998–2006 period, N$. (Euro1 = N$10)

Okongo, in 1998–2006, N$33 886 per household		**Kwandu, in 1998–2006,** N$19 557 per household	
Forestry, total, N$	7 759 897	Forestry, total, N$	2 989 949
– activities	7 468 892	– activities	2 964 311
– buildings	291 005	– buildings	25 638
Conservancy, total, N$	0	Conservancy, total, N$	1 117 133
– activities	0	– activities	520 663
– buildings	0	– buildings	596 470

The Kwandu Community had two projects in 1998–2006: one was in forestry the Namibia-Finland Forestry Programme (only Phase II in 2001–2005) and the other in conservancy the LIFE II (Living in a Finite Environment). Both projects invested in the development new future activities of the community. The conservancy project invested mainly in the salaries of community wildlife rangers and in an office building. The forestry support was mainly for training community members, supporting some forest activities and purchasing some basic forest tools. Total

support in Kwandu in 1998–2005 was about 4.1 million Namibian dollars, about N$19 557 per household (Table 6.23). The main activities of the forestry programme were training, nursery, forest inventory, and fire management. Moreover, some equipment was bought and a small store room was built. The total forest support in 2001–2005 was N$2 989 949. The conservancy project invested in the community level conservancy salaries (about N$20 000 per month) and in an office building and a community tourist camp site. The total conservancy support in 1998–2005 was N$1 117 133. The Government of Namibia also invested in these projects, mainly through forestry and conservancy staff salaries, transport and staff housing. In Kwandu the depreciation value of earlier investments such as buildings and equipment was N$553 119 in 2006 monetary value (Annex 1).

The above Okongo and Kwandu forestry and conservancy projects created a good basis for further development in Okongo and Kwandu, as they formed a basic structure for implementing conservancy and community forestry activities. They also increased the human capital by training and gave an opportunity to try out new community activities.

6.4 COMMUNITY BOOKKEEPING IN OKONGO AND KWANDU

The primary community bookkeeping data are explained under this heading 6.4. Both communities of Okongo and Kwandu have a community bookkeeping for community forest and conservancy activities, which are managed by a treasury. The Okongo bookkeeping has been carried out in Oshiwambo since 1998 when the project 'Sustainable Management of Indigenous Forests' started. The community forest continued bookkeeping after the project ended and therefore the community has continuous records on forestry which it can use for comparison purposes.

The Kwandu Conservancy and Community Forest has recorded the revenues and expenditures since 1999, which was when the conservancy activities started under the Life II Project and the community members received training and support for it. The bookkeeping is done in English. The Camp Site had separate bookkeeping records in 2005–2008, but from the year 2009 it has been a part of the general Kwandu community bookkeeping records.

6.5 COMMUNITY INTERVIEWS IN DATA COLLECTION IN OKONGO AND KWANDU

The primary community interviews are described under this heading. In spite of the original intention, the issue of costs was not included in the Okongo and Kwandu household survey questionnaire. These questions relating to costs were removed from

the original questionnaire to make it less extensive and time consuming to answer in the field. However, the costs were needed for the cost–benefit analysis. Because of this, the research project carried out interviews with the DOF staff in Okongo and Kwandu Community Forests in May 2009. The FCMs of both communities were interviewed in a one-day group interview using the respective local language. The interview was carried out using a specially designed questionnaire, which included questions about mean community prices and the hourly time consumption of agricultural, forestry, wildlife and eco-tourism activities. The prices obtained in this way were used in the benefit and cost calculations. The yearly costs of different production activities of households were calculated using data that were obtained from the Okongo and Kwandu interviews (Annexes 10–13).

6.6 DIFFERENCES IN THE OKONGO AND KWANDU DATA

The information given under this heading (6.6) illustrates the differences of the Okongo and Kwandu data. The big differences in quantities, expenditures and revenues in Okongo and Kwandu made it necessary to review the prices and costs. The calculations were based on community prices that were derived from community interviews, household survey data and different official statistics produced by the MAWF. These shadow prices were used in the calculations of home consumption whereas the realized market prices were used for the calculations of sales. The shadow prices were found to be the same or a little higher in Kwandu than in Okongo for crop production and forestry, but much lower for livestock. The shadow cattle prices of Okongo, which were obtained from the community interviews, were 30–225 per cent higher than the equivalent for Kwandu (Table 6.24). The cattle prices of the Okongo and Kwandu household surveys confirmed the same fact. The mean cattle prices were 1–184 per cent higher in Okongo than in Kwandu.

Table 6.24 A comparison of mean cattle prices in Okongo and Kwandu in 2006, N$, (Euro1 = N$10)

Cattle	Okongo, N$	Kwandu, N$	Difference, %
Cows	2 723	1 200	227
Oxen	2 378	2 850	83
Heifers	3 000	850	353
Calves	1 500	800	188
Bulls	5 000	4 000	125
Mean cattle price	2 373	1 288	184

It is most obvious that the reason for this price difference is cultural. In the Okongo area the Owambo culture dominates in which cattle are highly valued and are symbols of the wealth of households and other culture related status. Other causes

for the differences in cattle prices might include geographical location, distance to markets, supply and demand, poverty status and the structures of rural industries namely agriculture, forestry, wildlife and eco-tourism. The calculations were made using both local and common prices to eliminate the possible errors originating from the different cattle prices in Okongo and Kwandu. However, no significant differences were found using this method.

The respective labour costs of the Okongo and Kwandu areas did not differ. The value of labour was assumed to be the same in both areas. The same official hourly rate of agricultural work in Namibia was used for Okongo and Kwandu. However, the labour costs of certain activities were a little different in Okongo and Kwandu. The reason was that the communities stated the consumed time for the agricultural and forestry activities a little differently in the interviews. They did so according to their normal local practices in agricultural and forestry work. The wildlife revenues and costs apply only to Kwandu.

7. RESULTS

This 'results' chapter gives the net benefits and differences in net benefits for separate rural industries (agriculture, forestry, wildlife, eco-tourism and new community activities) in Okongo Community Forest and Emerging Conservancy and in Kwandu Community Forest and Conservancy for the 2003–2008 period. The change in poverty in Okongo and Kwandu Community Forest areas between the years 2006 when the community forest was legally established and 2008, the third year of community forest status, using total net benefits are also examined. Here community forestry is more closely studied. In addition this chapter clarifies the possible mechanisms (REDD-plus, PES or state subsidy) can be used to promote sustainable forest management in community forests in Okongo and Kwandu. The data were obtained from household surveys (2006), project and community book keeping records (2003–2008) and community interviews (2009).

In this 'results' chapter, the total net benefits accruing from agriculture, forestry and community group activities, which were the basic rural industries to generate benefits in Okongo and Kwandu in 2006, are presented under heading 7.1. The same rural industries are described over a period from 2003 to 2008 under heading 7.2. The new community activities of Okongo and Kwandu, which started with the conservancy and forestry projects in 2003–2008, are described under heading 7.3. Comparison of net benefits of rural industries in Okongo and Kwandu for 2006 and for the 2003–2008 period are presented under heading 7.4. Opportunity cost of the labour of agricultural, forestry and community group activities is determined under heading 7.5 by using the daily labour wage of N$23 or the zero value. The sensitivity analysis of the interest rates of the net benefits is presented under heading 7.6. Net benefit–cost ratios of Okongo and Kwandu in 2003–2008 are described under heading 7.7. Net Benefit – Investment Ratios (NBIR) of Okongo and Kwandu in 2003–2008 are presented under heading 7.8. Comparison of land and labour productivities in Okongo and Kwandu were explained under heading 7.9. Changes in poverty between 2006 when the community received the legal status of community forest and 2008 the third year of the community forest status in Okongo and Kwandu Community Forests are presented under heading 7.10. REDD-plus, PES or state subsidy as an instrument for sustainable forest management is described under heading 7.11.

7.1 AGRICULTURE, FORESTRY AND COMMUNITY GROUP ACTIVITIES IN BENEFIT GENERATION IN OKONGO AND KWANDU IN 2006

The agricultural and forestry activities are an important part of the daily routines and livelihood of the Okongo and Kwandu community members. The importance of labour costs connected with these activities should be emphasized. However, under Namibian communal area conditions this can lead to negative net benefits of subsistence agriculture due to a low productivity commensurate with high manual labour input per hectare. This happens especially when the value of labour input per day is derived from the commonly used farm worker's daily wage excluding food and housing compensation, and the daily value of N$23 is used for labour. In crop production, the revenues might not even cover the labour cost. In some cases the rationality of crop production could even be questioned. However, one should not underestimate the importance of household level production in daily consumption; its nearness, attainability and security.

Agricultural net benefits per household**,** including and excluding labour costs (at N$23 per day), in Okongo and Kwandu in 2006 are shown in Figures 7.1 and 7.2. Labour costs in Namibia i.e. Okongo and Kwandu are described more in detail under heading 5.1 (Labour).

The total agricultural net benefit (home consumption and sales) of Okongo was N$2 908 757 when the labour input of community members did not have any opportunity cost and labour costs were excluded from calculations (N$12 702 per household). When computational labour costs were included, the net benefit was negative, N$-1 391 804 (N$ -6 078 per household). The agricultural sales excluding labour costs were N$372 044 (or N$1 642 per household) and N$295 358 (or N$1 290 per household) when labour costs at the daily rate of N$23 was used.
The total net benefit of agriculture (home consumption and sales) of Kwandu was N$363 881 (N$1 733 per household) when labour costs did not have any opportunity cost and labour costs were excluded from calculation. The total net benefit of agriculture was N$ -249 844 (N$ -119 per household) when labour costs were included. The total agricultural sales were N$93 360 (or N$446 per household) when labour costs were excluded, and N$ -7 892 (or N$ -38 per household) when the daily wage rate of N$23 was used in labour costs.

The forestry net benefits per household in Okongo and Kwandu in 2006 are shown in Figures 7.3 and 7.4. The concept of forestry in the study is regarded to be the forest home consumption and sales by the community members from the community forest area.

The total net benefit of forestry of the Okongo in 2006 was N$981 116 (N$4 284 per household) when labour costs were excluded, and N$622 179 (N$2 717 per household) when the labour costs were included. The total forest sales in 2006 in

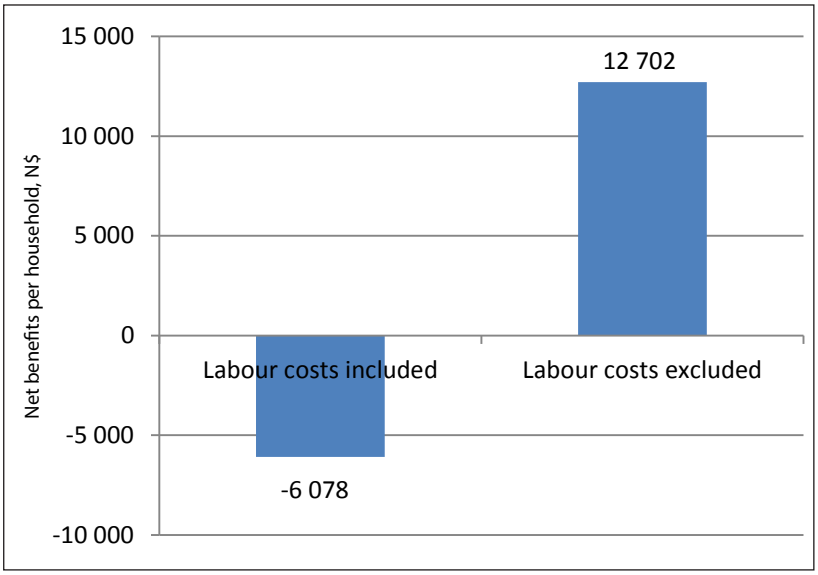


Figure 7.1 Agricultural net benefits for home consumption and sales per household including and excluding labour costs in Okongo in 2006, interest rate of 6 per cent, N$. (Euro1 = N$10)

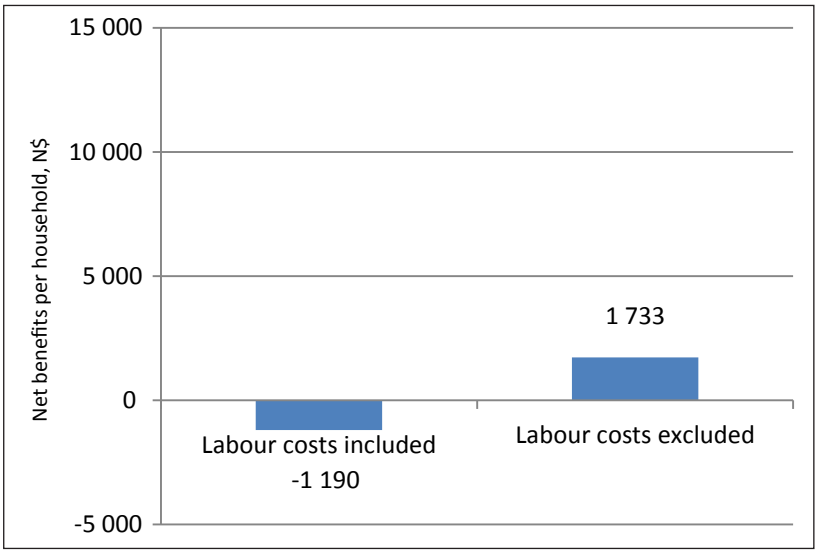


Figure 7.2 Agricultural net benefits for home consumption and sales per household including and excluding labour costs in Kwandu in 2006, interest rate of 6 per cent, N$. (Euro1 = N$10)

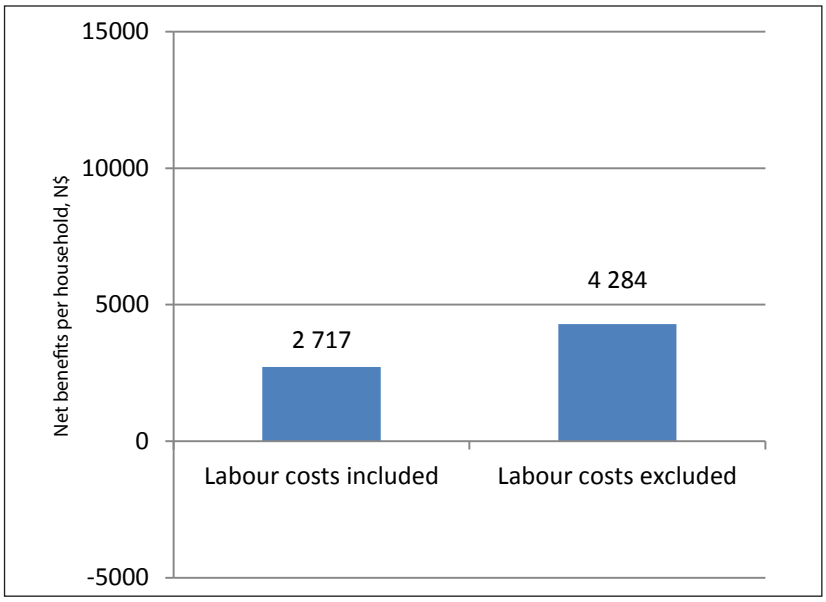


Figure 7.3 Forestry net benefits for home consumption and sales per household including and excluding labour costs in Okongo 2006, interest rate of 6 per cent, N$. (Euro1 = N$10)

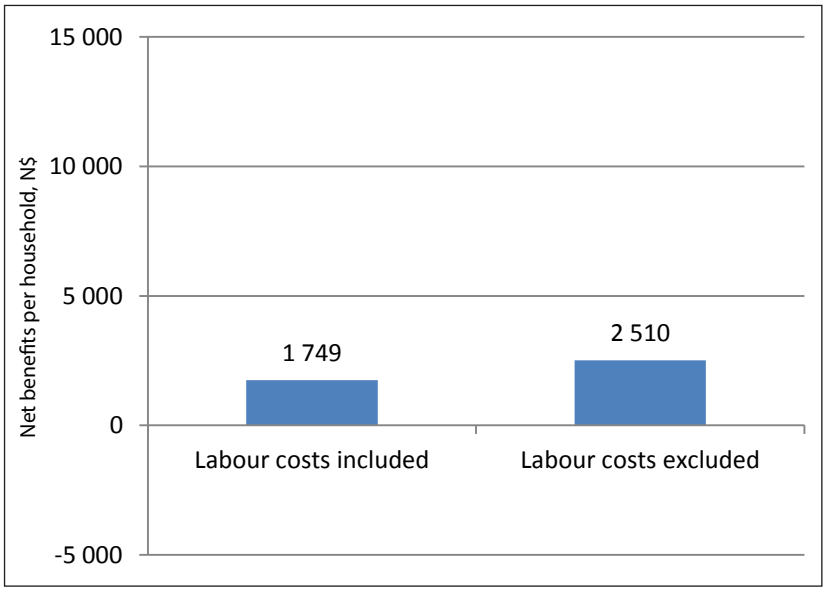


Figure 7.4 Forestry net benefits for home consumption and sales per household including labour costs and excluding labour costs in Kwandu in 2006, interest rate of 6 per cent, N$. (Euro1 = N$10)

Okongo were modest, N$14 612 (or N$64 per household) when the costs were not included. When the labour costs were included, the forest sales were N$8 340 (or N$36 per household).

The total net benefit of forestry from home consumption and sales for Kwandu was N$527 171 (N$1 749 per household) when labour costs were excluded and the labour cost did not have any opportunity cost. Alternatively, when labour costs were included the total net benefit accruing from forest was N$367 236 (N$2 510 per household). The total sales were modest, N$30 834 (or N$147 per household) when labour costs were excluded, and N$20 789 (or N$99 per household) when labour costs were included.

Forestry brought positive net benefits to households in both communities. The net benefits of forestry sales per household (by using the daily rate of N$23) were N$63 higher in Kwandu than in Okongo.

7.2 AGRICULTURE, FORESTRY AND COMMUNITY GROUP ACTIVITIES IN BENEFIT GENERATION IN OKONGO AND KWANDU FOR THE 2003–2008 PERIOD

Agriculture and forestry practices have old traditions in Okongo. Agriculture, specially animal husbandry, closely belongs to the daily life and culture of the Okongo community members. It generates revenues and also maintains the wealth of households as livestock assets. Despite this, agriculture had a clearly negative mean net benefit per year per household (N$ -6 272) in Okongo in 2003–2008 when using the wage of N$23 per day.

Mean agriculture, forestry and community group activity net benefits of Okongo excluding labour costs are presented in Table 7.1. In the case of agriculture, it seemed to be a profitable rural industry when variable costs included only the seed and vaccination costs. The use of artificial fertilizers was not common in Okongo and Kwandu at that time and a price for manure was not determined in this study. The mean annual net benefit of agriculture per household for the period 2003–2008 inclusive was N$13 107. The mean net benefit of agriculture per the total community forest area (55 918 ha) hectare was N$54, and the mean net benefit of its agricultural area; pasture (10 625 ha) and crop land (2 936 ha) combined was N$221 per hectare.

Table 7.1 Mean net benefits of agriculture, forestry and community group activities for 2003–2008 inclusive in Okongo, excluding labour costs, N$. (Euro1 = N$10)

Rural industry	Agriculture	Forestry	Community groups
Benefits	3 029 990	1 012 425	13 534
Costs	28 410	0	0
Net benefits	3 001 580	1 012 425	13 534

In Okongo nearly all households cultivate pearl millet and produce cattle and these are ubiquitous. It is important to note that the large numbers of cattle in Okongo serve cultural traditions and are not solely for production purposes. One should also take into account that most of the agricultural production is for home consumption (87 per cent). Consequently, the sales are modest and they do not bring in much revenue to the households.

The mean net benefit of forestry per household per year over the 2003–2008 period in Okongo excluding labour costs was N$4 421. The mean net benefit of forestry was N$18 per community forest area (55 918 ha) hectare and N$24 per production forest area (42 357 ha) hectare. Forest products and their home consumption which amounted to 98 per cent of the forest production were important in the daily life of the community members. Firewood was still widely used. Moreover, wood was commonly used in the construction of fences and huts. The timber sales for the community were still modest. The existing standing forest stock (42.3 m^3/ha) and natural dry conditions limit the development of forestry in Okongo.

The costs for forestry consisted mainly of labour costs because the forest work was still largely manual and done by hand axe and saw in Okongo and Kwandu. The forest transport was managed by using draft donkeys. In this study the labour costs in forestry were taken to be equal to those in subsistence agriculture, N$23 per day per person or N$2.25 per hour. On the other hand Chapra and Dasgupta (2008) have estimated the fuel wood collection to be 5 per cent of the mean agricultural wage rate, which would imply the daily rate of N$2.5 in this study. This kind of labour cost might underestimate the value of the labour input in forestry and consequently give an excessively high net benefit value for forestry. Mmopelwa (2006) has used the shadow wage, which was 50 per cent of the market rate. The market price of labour in forestry in Okongo was N$50 in 2007, and the labour cost used in this present study was 46 per cent of it.

When labour costs at the daily rate of N$23 were included, the mean net benefit per household per year was N$2 812 in forestry in Okongo. Mean net benefit of forestry including labour costs was N$12 per community forest hectare and N$15 per production forest hectare. The net benefit of community group activities per household per year was N$59 when labour costs were excluded and N$14 when labour costs were included. More detailed yearly information on the rural industries of Okongo for the 2003–2008 period with labour costs of agriculture, forestry and community group activities, and also excluding labour costs in addition to excluding home consumption are presented in Annexes 2–4.

Agriculture and forestry were practiced in nearly all Kwandu households but the production levels were more modest than those of Okongo. Both agricultural and forestry productions were important for the Kwandu community members in their

daily life. The net benefits of agriculture, forestry and community group activities of Kwandu excluding the labour costs in 2003–2008 are presented in Table 7.2.

Table 7.2 Mean net benefits of agriculture, forestry and community group activities for 2003–2008 inclusive in Kwandu, excluding labour costs, N$. (Euro1 = N$10)

Rural industry	Agriculture	Forestry	Community groups
Benefits	382 097	543 994	11 271
Costs	6 604	0	5 973
Net benefits	375 493	543 994	5 298

The mean net benefit of agriculture per household per year in Kwandu excluding labour costs was N$1 788 for the 2003–2008 period. The mean net benefit of agriculture excluding labour costs was N$19 per community forest area hectare (19 888 ha). When the labour costs at the daily rate of N$23 were included, the main net benefit of agriculture per household was negative, -1 226 Namibian dollars.

The mean net benefit of forestry per household per year excluding labour costs in Kwandu was N$2 590 for the 2003–2008 period. The mean net benefit of forestry excluding labour costs was N$27 per community forest area hectare or N$47 per production forest area hectare, which was 58 per cent of community forest area. When the labour costs were included at N$23 per day, the mean net benefit per household was N$18 045. The mean net benefit of forestry including labour costs was N$19 per community forest hectare or N$33 per production forest hectare.

The net benefits of community group activities were more modest in Kwandu than in Okongo. Community group activities brought only N$25 per household per year when labour costs were excluded. More detailed information on rural industries (agriculture, forestry and community group activities) in Kwandu for the 2003–2008 period with and without labour costs, and without home consumption of agriculture, forestry and community group activities are given in Annex 5–7.

7.3 NEW COMMUNITY ACTIVITIES IN BENEFIT GENERATION IN OKONGO IN THE 2005–2008 PERIOD AND IN KWANDU IN THE 2003–2008 PERIOD

The purpose of this section is to present the net benefits accruing from the new community activities of Okongo and Kwandu in more detail: different community trials, community forestry, community tourist camp site, carpentry and trophy hunting. The Okongo data covers the years 2005–2008 inclusive. The Kwandu data covers the years 2003–2008 inc. for the Kwandu community started to benefit from conservancy activities already in 2003.

In general the total net benefit of community trials of Okongo in 2005–2008 inc. was marginally positive, N$122 per year (or the computational N$0.5 per household per year) (Table 7.3). The guinea fowl trial gave a positive total net benefit of N$1 522 in the 2005–2008 period, which was N$381 per year (or the computational N$1.7 per household per year), but some other trials such as grinding cereals by hammer mill were failures and gave negative results. In practice these trials were supported by the forest project and so the community itself did not incur any real economic risk in carrying out these trials. The forest project was a good opportunity to try new activities and a method to test their viability in the community. The guinea fowl rearing enterprise proved to be a viable activity and it started to spread among the households.

Table 7.3 Net benefits of new community activities in Okongo, including labour costs in 2005–2008, N$. (Euro1 = N$10)

Activity	Benefits, N$, 2005–2008	Costs, N$, 2005–2008	Total net benefits, N$, 2005–2008
Community trials	5 123	4 636	487
Carpentry	32 395	18 268	14 127
Community forestry	168 097	28 179	139 918
Community camp site	27 828	16 602	11 226
Total	233 443	67 685	165 758
Per household (229)	1 019	296	724

The Okongo community also had some other new community activities in the 2005–2008 period. The net benefits obtained from other new community activities such as running a community tourist camp site and carpentry were low, because the activities of these enterprises were still modest in the community. Carpentry started in 2007. A mean net benefit per year for the 2007–2008 period inclusive was N$7 064 (or the computational N$31per household per year), or N$0.1 per community forest area hectare. The community tourist camp site activities started in 2005. The community tourist camp site in Omauni served as a necessary and the only accommodation facility to serve this remote area. It brought in a mean net benefit of N$2 807 per year (or the computational N$12 per household per year) or N$0.05 per community forest and N$0.6 production forest area hectares for the 2005–2008 inclusive period. The next few years will show the sustainability or otherwise of these activities in the community. Both carpentry and tourism activities could be beneficial for community development. The planned wildlife activities could increase the number of tourist stays in the camp site and the community forest could provide valuable tree species and guarantee the raw material supply for the carpentry enterprise. The new community activities should increase efficiency and provide potential Pareto improvements.

The community forestry activities of Okongo had already started in 2005 (before the legal declaration of community forest rights) on a small scale and more actively at the end of 2007 with a timber sale of N$113 918, which gave the computational value of N$497 per household. In 2006–2008 inclusive period community forestry brought a mean net benefit of N$46 639 per year to the community (or the computational N$204 per household per year). These figures show that community forestry had already some minor role from the very beginning in the Okongo community (i.e. N$0.8 per community forest area hectare or N$1.1 per production forest area hectare per year). In practice the benefits of community forestry had not reached all households. In the coming years, community forestry can be expected to give some extra revenues to the community and by dint of sharing to the households, providing the forest resources are managed sustainably. Community forestry could be regarded as one of the community development tools. However, the Okongo community cannot rely solely on community forestry in its development plans, because the forest resources of Okongo are limited, not in hectares but in cubic metres and growth.

Obviously the earlier investments of the forestry project helped in setting up these new community activities of the above mentioned. The new community activities of Okongo in the 2005–2008 period; community trials, carpentry, community forestry and community camp site brought a mean total net benefit of N$41 440 per year or the computational N$181 per household per year into the community assuming the funds had been distributed directly into the households. This was N$0.7 per community forest area hectare. In 2006–2008, community forestry proved to be a more profitable new community activity than community trials, carpentry or the community camp site in Okongo.

The Kwandu community started three new community activities in 2003–2008: 1) community forestry, 2) community tourist camp site and 3) trophy hunting (Table 7.4). The most lucrative of these was trophy hunting, and it took a leading role in supporting the other new community activities; community tourist camp site and community forestry.

Table 7.4 Net benefits of new community activities in Kwandu, including labour costs in 2003–2008, N$. (Euro1 = N$10)

Activity	Benefits, N$	Costs, N$	Net benefits, N$
Community forestry	20 728	707 923	-687 195
Community camp site	256 786	264 991	-8 205
Trophy hunting	1 260 325	720 531	539 794
Total	1 537 839	1 693 445	-155 606
Per household (210)	7 323	8 064	-741

Trophy hunting had already started to bring benefits into Kwandu in 2003. However, the community took a cautious approach to the conservancy activities and used only one tenth of its possible wildlife resources yearly. The total mean net benefit of trophy hunting for 2003–2008 inclusive was N$89 966 per year (or the computational N$428 per household per year), which was N$5 per community forest area hectare or N$11 per wildlife area hectare (42 per cent of the total forest area). In the 2004–2008 period the Kwandu conservancy received a total of N$88 381 as wildlife damage compensation through HACSIS, which was a mean of N$17 676 per year (or the computational N$84 per household per year). The Kwandu Conservancy could distribute a total surplus of wildlife benefits of N$11 047 to households over the 2004–2008 period, which was N$53 per household. The total conservancy distribution of N$99 208, which also included the payments to the traditional authorities, was about 18.4 per cent of the total net wildlife benefits for the 2003–2008 period. The other net benefits of trophy hunting had to be used for supporting the other common community activities.

In the community forestry activities of the Kwandu community also took a cautious approach as they decided to use only a half of its possible annual cut. The community did not start the timber sales on a larger scale immediately after receiving the legal rights of community forest in 2006. The net benefits from community forestry were clearly negative for the 2006–2008 period due to the larger forest management costs incurred. The salary costs of administration, field patrolling and forest work were planned to be divided between community forestry and conservancy. The same 23-person committee had looked after both of them since 2003. Forest management was regarded as an important part of the conservancy management because the forest provided and maintained the shelters and habitats of wild animals. This effect matched well with the community forest development aims. The project support for the conservancy in Kwandu started in 1998 and the activities of the forest project in 2001. The Kwandu Community continued the game and community forestry activities, when the conservancy and forest projects ended in 2005 and took over the responsibility of paying the salaries of the forest and conservancy management committee, basically from the game revenues.

Table 7.4 shows a clearly negative net benefit from community forestry for the 2003–2008 period, which was N$ -114 532 per year (or the computational N$ -545 per household per year), or N$ -6 per community forest area hectare, or N$ -10 per production forest area hectare. It originated nearly totally from the costs of the forest management committee. Table 7.4 also shows that the Kwandu community had not started comprehensive community forestry activities by 2008. The community forestry revenues for 2006-2008 were modest. The development of conservancy was predominant in the community. However, in the yearly plan of 2009 were already marked down timber sales of N$150 000; as 100 live trees and 400 dead

trees, and the materialized timber sales in 2009 were N$94 000 (Mulowfa 2010, personal communication).

The Kwandu community opened the Bum Hill Camp Site at the end of the year 2004, which is a site of high standards with warm water heated by solar panels and some luxury sites with wooden decks. It is situated next to the Kwando River and flood plains and has an abundance of game. However, this community camp site brought a negative net benefit for the 2005–2008 period, which was N$ -2 051 per year (or the computational N$ -10 per household per year), or N$ -0.1 per hectare of community forest. The main reason for entering into this negative net benefit might have been that in the 2007–2008 period some camp site funds were 'lost' (a fraud case) and they were neither entered into the community funds nor the community bookkeeping records.

At the end of the budget year 2008/2009 (1 April 2008 – 31 March 2009) the Kwandu conservancy had some minor financial difficulties in funding common community activities. At that time, the upcoming trophy hunting and community forestry sales were still under consideration and some salaries of community tourist camp site, community forestry and conservancy were still unpaid and pending due to the lack of funds. In Table 7.4 these unpaid salaries were included and visible as a negative net benefit amounting to N$ -155 606, according to the prevailing situation in the community. The unpaid salaries of management committee and the camp site personnel were thus marked down as liabilities.

7.4 COMPARISON OF NET BENEFITS OF RURAL INDUSTRIES OF OKONGO AND KWANDU

Rural industries of Okongo and Kwandu were compared in the single year of 2006 and over the 2003–2008 period. The net benefits included labour costs.

7.4.1 COMPARISON OF NET BENEFITS IN A SINGLE YEAR 2006 IN OKONGO AND KWANDU

When the net benefits of rural industries in Okongo and Kwandu were compared in a single year (2006), the differences between rural industries are likely to be over emphasized (Table 7.5). Labour costs were calculated at the labour wage of N$23 per day for agriculture, forestry and community group activities, and for common community activities as materialized labour costs.

Table 7.5 Total net benefits, mean net benefits per household and net benefits per community forest area hectare of rural industries in Okongo and Kwandu in 2006, including labour costs, N$. (Euro1 = N$10)

Rural industry activity	**Okongo** (55 918 ha)	**Per household in Okongo** (229)	**Per ha in Okongo**	**Kwandu** (19 888 ha)	**Per household in Kwandu** (210)	**Per ha in Kwandu**
Agriculture	-1 391 804	-6 078	-24.9	-249 844	-1 190	-12.6
Forestry	622 179	2 717	11.1	367 236	1 749	18.5
Community group activities	3 083	13	0.06	385	2	0.02
Community trials	-1 7141	-75	-0.31	0	0	0
Carpentry	0	0	0	0	0	0
Community forestry	22 310	97	0.40	-103 171	-491	-5.2
Community camp site	4 551	20	0.08	-15 923	-76	-0.8
Trophy hunting	0	0	0	26 441	126	1.3
Total	-741 058	-3 236	-13.3	25 124	120	1.3

Agriculture is now highlighted because of its negative benefits incurred by high labour costs and forestry is also highlighted due to its positive benefits for both communities. However, the development histories of rural industries are different and the skills of community members might not yet be at the same level for all rural industries. Moreover, the main driving force of these rural industries could differ from each other. Agriculture, forestry and community group activities are driven by the individual households themselves. The other rural industries including, community trials, carpentry, community forestry, community tourist camp site and trophy hunting are collectively driven by the community, at the beginning as per the project plan. Quite often the activities of the agricultural and forestry home consumption are regarded as belonging to the normal daily routines of community members who have no participatory roles in these activities and therefore have no a revenue source. The agricultural and forestry home consumption is not considered to have any associated opportunity cost due to the limited revenue sources in the community. Here one should also take into account the fact that 94 per cent of the Okongo and 76 per cent of Kwandu households also receive benefits from non-farming activities including: gifts, salaries, business income and pensions. (See Table 6.4). However, these revenues have had little improvement on the living standard and only played a supporting role at best. A certain rural industry can also be the sole and modest benefit source for a household in Okongo and Kwandu. This can lead the household to being vulnerable to living in deprivation.

7.4.2 COMPARISON OF NET BENEFITS IN THE 2003–2008 PERIOD IN OKONGO AND KWANDU

Tables of the total yearly net benefits of the Okongo and Kwandu rural industries for the 2003–2008 period have been compiled. The interest rate used was 6 per cent. Agriculture, forestry, community group activities, community forestry, community tourist camp site, community trials (only in Okongo), carpentry (only in Okongo) and trophy hunting (only in Kwandu) were all taken into account. Three net benefit options were calculated for Okongo and Kwandu and these options are: 1) basic (including labour costs and the home consumption of agriculture, forestry and community group activities), 2) basic excluding labour costs of agriculture, forestry and community group activities, and 3) basic excluding home consumption of agriculture, forestry and community group activities.

The mean yearly total net benefits of Okongo for the 2003–2008 period were negative (N$ -773 578 or N$ -3 378 per household) or N$ -13.8 per community forest area hectare, and just a little above zero in Kwandu (N$48 551 or N$231 per household) or N$2.4 per community forest area hectare when the computational labour costs (by the daily wage of N$23) and home consumption of agriculture, forestry and community group activities (option: basic) were taken into account. The labour cost of N$23 per day resulted in the low or negative total net benefits. However, agriculture is for producing a basic food supply for the community population to survive in the area.

Community forestry for the 2006–2008 period was more profitable in Okongo where timber sales had started earlier and the forest management costs were lower. For community forestry, the Okongo Community Forest had accrued benefits every year during the 2005–2008 period, whereas the Kwandu Community Forest had yielded some benefits every second year (Figure 7.5). The net benefits of community forestry were positive in Okongo but negative in Kwandu, due to high management costs. The main aim of forestry in Kwandu in the 2003–2005 period was conservation. Therefore it can be assumed that the influence of this on the forest area was positive in that it reduced forest fires and illegal activities, *inter alia*. In any case these two communities could be called 'forestry communities' under the Namibian conditions. Forestry is an integral part of the daily life of nearly all households.

The Okongo community was somewhat more prepared for the community forestry activities and timber sales than was the Kwandu community in 2006, when the status of these two community forests were legally established. Possibly the Okongo forest project invested more in preparing the community for participation in community forestry than its counterpart in Kwandu. In addition, the need for the forest revenues might have been higher in Okongo than in Kwandu. Community forestry was seen as an opportunity for extra revenues in Okongo, whereas the Kwandu community had already the trophy hunting option for obtaining the extra

revenues for the community. In Kwandu the conservancy activities might have taken some resources from the community forest development. Kwandu has been regarded more as a conservancy community than a community forest community. However, the Kwandu community started to bring community forestry on board little by little over the 2006–2008 period. The net benefits of the Okongo and Kwandu Community Forests were not appreciable or sufficient for dividends to be distributed to the community forest members. Thus community forestry did not instantly alleviate poverty.

The forest project in Okongo encouraged the community to try new community trials. The community tourist camp sites started in both Okongo and Kwandu in 2005. The Okongo tourist camp site is situated inside the village of Omauni. It has been used as an accommodation facility in the area and it has been managed according to current accommodation needs on a daily basis. The Okongo site is a more community oriented and more remote community tourist camp site than its counterpart in Kwandu. It could be of interest to more culture-oriented tourists. The community tourist camp site in Kwandu is more wildlife oriented than Omauni. It is located close to the main road and has good facilities for wildlife camping. In Kwandu the camp site staff are present round the clock, which incurs higher salary costs for the community. In the 2005–2008 period the Okongo community tourist camp site showed positive results whereas the tourist camp in Kwandu had negative results. These figures could just as easily have been the other way round when the numbers of tourists visiting community tourist camp sites were considered. In 2006, the Kwandu community tourist camp site had 707 visitors, or a mean of 59 visitors per month, and the Okongo community tourist camp site had 163 visitors, giving a mean of 14 visitors per month.

The Okongo community started the carpentry enterprise in 2007. This project was linked to the community forestry activities. First, the community hired carpenters from outside to train the community members in carpentry, which incurred some extra costs to the community. The community also bought some carpentry equipment of its own. Carpentry could potentially be a popular part of the community forest activities in Okongo when the skills of community members in carpentry reach an adequate level and the markets are established. In Kwandu trophy hunting brought revenues to the community in the 2003–2008 period, and it is quite obvious that it will be one of the leading rural industries in the future. The location of Kwandu is excellent for this kind of activity and trophy hunting is a growing sector in tourism.

In a study by Paramasevam et al. (2001) it was noted that benefits to environmental management systems come four years after implementation. The results of Okongo and Kwandu (especially trophy hunting in Kwandu) show that a new community activity, which matches well to the structure of the community,

is already visible in the economy of the community after five years and possibly become a predominant and permanent rural industry within 10 years.

7.5 VALUE OF LABOUR IN AGRICULTURAL, FORESTRY AND COMMUNITY GROUP ACTIVITIES IN OKONGO AND KWANDU IN 2006

The labour costs of the Okongo and Kwandu rural industries were calculated. The value of the total labour input in agriculture, forestry and community group activities per Okongo household in 2006 was N$20 391 (Table 7.6). It was about 887 person-days, which is equal to the labour input of 3.5 persons per one year when the daily salary of N$23 was used.

Table 7.6 Labour input values of agriculture, forestry and community group activities in Okongo and Kwandu in 2006 at the daily labour rate of N$23. (Euro1 = N$10)

2006 labour input, N$	Total agricultural labour input	Agricultural labour input per household	Total forestry labour input	Forestry labour input per household	Total community group activity labour input	Community group activity labour input per household	Total labour input per household
Okongo	4 300 561	18 780	358 937	1 567	10 032	44	20 391
Kwandu	613 725	2 923	159 935	762	4 750	23	3 708

The value of total labour input per Kwandu household in agriculture, forestry and community group activities in 2006 was N$3 708, which was about 161 person-days at the minimum daily wage of the agricultural worker without food and housing compensation (N$23 per day), and which is equal to the labour input of one person per 7 months.

The working practices were the same for both communities and took almost the same amount of time per unit. However, the revenues obtained from the crop fields were low[107] for both communities. Should the costs, i.e. labour costs, be included when rural industries at the community level are compared? Arguably this question can be posed especially when home consumption forms a major part of the agricultural and forestry production. For example, farmers use their own family labour without payment, because there is no observed wage rate for household labour and so it is not included as a cost (Seo et al. 2009). In such a case home consumption is valued at market value of each product.

107 For example, pearl millet: benefits N$735/ha (yield 350 kg/ha and price N$2.1/kg) and costs N$1 426 per hectare (labour costs were included and the daily rate of N$23 was used).

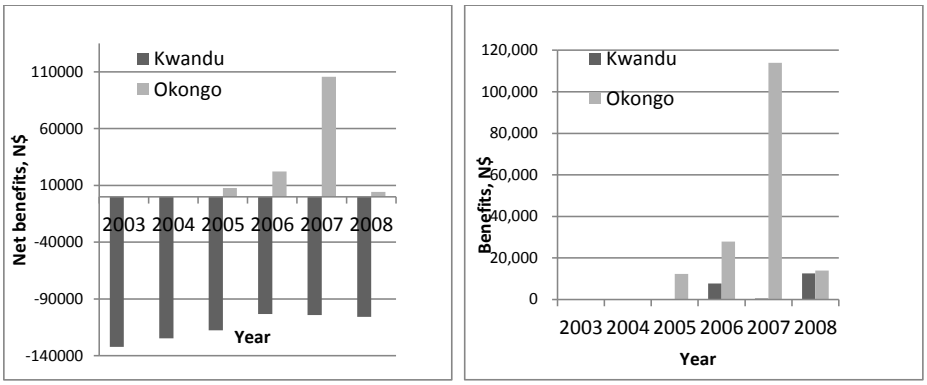


Figure 7.5. Net benefits (left) and benefits (right) of community forestry in Okongo and Kwandu in the 2003–2008 period, N$. (Euro1 = N$10)

The foregoing figures of Okongo and Kwandu for the agriculture, forestry and community group activities show that it is necessary to obtain information on the costs in order to get an accurate picture of the rural industries in the community. This is especially the case when considering their profitability, inputs and opportunity costs. Otherwise one is likely to get a better total economic picture of the situation than is the case in reality. If the costs (labour costs) are not included, one can overestimate the profitability of agriculture, forestry or community group activities. If home consumption is not included, one can underestimate the scale of agriculture and forestry in the community, because the share of home consumption is high in communities such as Okongo and Kwandu. Therefore figures for which labour costs of the agricultural, forestry and community group activities are included, illustrate the accurate status of rural industries of Okongo and Kwandu than without labour costs included. It also makes the comparison of the rural industries possible, especially when the net benefits are calculated for the same time frame. However, the labour cost per day could be questioned.

7.6 SENSITIVITY ANALYSIS OF THE INTEREST RATES OF THE NET BENEFITS

The @RISK Programme (a trial version) was used to find the interest rate for the cost–benefit analysis in order to be able to correctly estimate the profitabilities of the rural industries in the Okongo and Kwandu communities in a 10-year period (1999–2008). The presumption was that the intrest rate of 6 per cent was to be used for the Okongo and Kwandu communities. This percentage has been used in the last few years in quite many communal area studies in Namibia. Moreover, the economy of the Okongo and Kwandu communities had remained unchanged

over those same years. The other presumption was that when the rural industries of Okongo and Kwandu were natural resource related, the interest rate should not be too high. Otherwise the share of natural resources could be overstimated, which could lead to the overuse of the forest resources.

Sensitivity analysis can be conducted by using the lower and upper bounds for discount rates. In this study the sensitivity analysis was carried out for discount rates that ranged between 1–10 per cent in order to investigate how the size of discount rate changes the total net benefits derived from agriculture and forestry activities.

The three net benefit options of agriculture in Kwandu were chosen: 1) labour costs with home consumption included, 2) labour costs excluded and, 3) home consumption excluded. The discrete runs of the @RISK Programme showed that the differences in the net benefits of agriculture in Kwandu in 1999–2008 inclusive were quite small when different interest rates of between 1 and 10 per cent were used for the three options. These options are presented in Figure 7.6. Similar types of calculations were made for the net benefits of forestry in Kwandu and for agriculture and forestry in Okongo, and the results were similar.

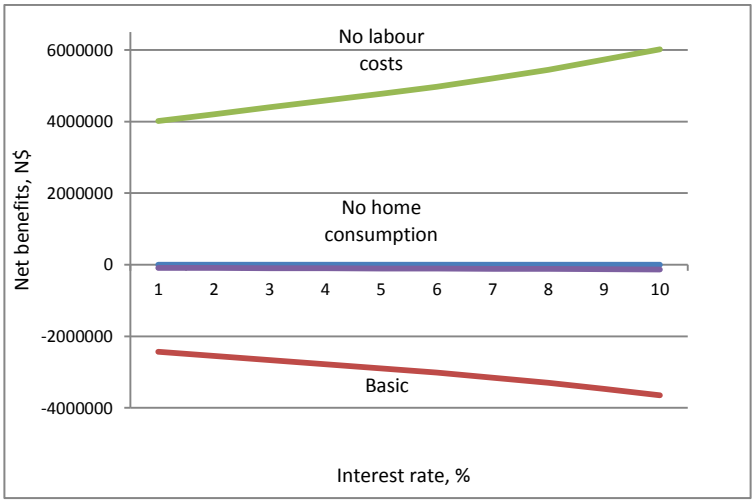


Figure 7.6 Effects of interest rates 1–10 per cent to the agricultural net benefits in Kwandu for 1999–2008 inclusive, N$. (Euro1 = N$10)

In some years the net benefits were quite low, especially in Kwandu. In such a case a bit mistaken interest rate does not skew the net benefit to a great extent if the net benefits are higher. This is also apparent in Figure 7.6 with an option of home consumption excluded (sale). The net benefits, which were low, were quite close to each other when interest rates of between 1 and 10 per cent were used. When the interest rate of 5 per cent was used in the option where the labour costs were excluded, the total net benefit of agriculture of N$4 967 713 was obtained. On the

other hand when the interest rate of 6 per cent was used, the total net benefit of agriculture of N$4 776 378 was obtained. The difference in benefits between these sums was about 4 per cent. The analyses of net benefits by the @RISK Programme and different interest rates did not show any reason for not using the default interest rate of 6 per cent.

7.7 NET BENEFIT–COST RATIOS IN OKONGO AND KWANDU IN 2003–2008

The general economic trends of the Okongo and Kwandu Community Forests in the 2003–2008 period were calculated by using the yearly net benefit–cost ratios, which are discounted measures of capital productivity, based on current worth of gross costs. The net benefit–cost ratios, which gave a relative profitability of activities, were calculated for three options; 1) labour costs with home consumption of agriculture, forestry and community group activities included, 2) labour costs of agriculture, forestry and community group activities were excluded, and 3) home consumption of agriculture, forestry and community group activities was excluded (sales) (Annexes 8 and 9).

When the home consumption and labour costs were included (Annex 8), the quite constant yearly benefit–cost ratios of Okongo over the 2003–2008 period were smaller than 1 due to the labour intensive subsistence agriculture practiced. A small deviation appeared in 2005 when the community started some new community activities (community trials, community forestry and community camp site) and started to take full responsibility for paying the community forest costs including a vehicle and also the FMC.

When the labour costs of agriculture, forestry and community group activities were excluded, the net benefit–cost ratios were bigger than 1. The increase in project costs in 2003 was visible in addition to the start of the new activities: community trials, community forestry and the main camp site in 2005. A change occurred in 2007–2008 when the community started the carpentry enterprise and increased community forestry activities were apparent in the net benefit–cost ratios. The net benefit–cost ratios showed the economic development of the community activities. For example, the ending of the forest project support in 2005–2006 when the community had to take full responsibility of the new community activities and meet their costs themselves. The timber sale revenues normalized the trend in 2007.

When the home consumption of agriculture, forestry and community group activities was excluded the net benefit–cost ratios were about one. In general the sales were modest in Okongo in the 2003–2008 period. The sales increased when the community started to diversify and increase its activities in 2005. Starting new community activities lead to an increase in costs.

The Kwandu net benefit–cost ratios and net benefits for the 2003–2008 period, including home consumption and labour costs of agriculture, forestry and community group activities are presented in Annex 9.

The net benefit–cost ratios of Kwandu were also good for the years in which the changes happened and are shown in the community. In 2003 the community started to look after its forest and wildlife resources and paid the wages of about 20 community members for this work. In 2003, the community also started to receive benefits from trophy hunting. The camp site activities started in 2005. In the same year the forestry and conservancy projects ended and the community had to take full responsibility for the common community activities regarding forestry and wildlife. The community was in a new situation on a limited economic basis. These constraints caused hesitation in community decision-making. However, as early as 2007 the economy of the community started to improve due to the benefits from trophy hunting, which in that year were double those of the previous year. Again there more hesitation occurred in early 2009 (at the end of the budget year 2008/2009). The community still had the wood trade sales under consideration, but it had not begun the yearly game trade at that time. However, by this time trophy hunting was already bringing some yearly revenues into the Kwandu community.

When the labour costs of agriculture, forestry and community group activities were excluded in 2003, the change in net benefit–cost ratio is clear. The benefit–cost ratios dropped. In that year trophy hunting started to bring in more benefits and costs such as community forestry. The costs of trophy hunting were shared among common forest activities in the community. The net benefit figure also shows the increased benefits from trophy hunting in 2007.

The net benefit–cost ratios and net benefits of Kwandu in 2003–2008 when home consumption of agriculture, forestry and community group activities were excluded are presented in Annex 9. The figures illustrate the Kwandu sales over the 2003–2008 period. In 2003, the new community activity of trophy hunting doubled the sales that were previously based only on agriculture and forestry. However, the activity more than doubled the costs, which were also shared along with forestry. Further, in 2005 the camp site costs decreased the profits of the community activities. In Kwandu, the net benefits of sales were negative in 2005 and 2006. Nonetheless, in 2007, the trophy hunting benefits doubled, whereas the costs stayed at the same level. This change in sales can be seen the net benefit–cost ratios and the net benefits figures. Moreover, in Kwandu the new community activities generated more costs than revenues at the beginning.

The net benefit–cost ratios are suitable to show the economic development of a community that is in the process of implementing new activities that affect that community. The net benefit might illustrate the common development trend better.

As stated earlier, the omission of costs might give a misleading picture of the profitability of rural industries. It especially happens when the communities had not

yet started to diversify their rural industries and only concentrated on the agricultural and forestry home consumption. When the costs are included the results are more in line with the predominant conditions in the Okongo and Kwandu communities. According to these results, the economies of Okongo and Kwandu were on an economically vulnerable basis. This was also the situation in practice. Some other studies have not elaborated wages for household labour. Seo et al. (2009) accepted net revenues to include returns to land or household labour. According to them household farms that rely mainly on their own labour may appear to have higher net benefits per hectare compared to commercial farms that rely on employed and hired labour.

7.8 NET BENEFIT INVESTMENT RATIOS (NBIR) OF OKONGO AND KWANDU

The study also used Net Benefit - Investment ratios (NBIR) to compare rural industries for the 2003–2008 period in Okongo and Kwandu (Table 7.7). This method takes into account that part of costs that are investments, which precede later benefits.

Table 7.7 Net benefit –investment ratios of rural industries in Okongo and Kwandu in the 2003–2008 period.

Net benefit – investment ratios	Okongo			Kwandu		
Rural industries	**Ratio**	**Positive**	**Negative**	**Ratio**	**Positive**	**Negative**
Agriculture	n/a		-8 617 314	n/a		-1 545 152
Forestry	n/a	3 864 074		n/a	2 077 383	
Community groups	n/a	19 090		n/a	2 383	
Community forestry	n/a	139 918		n/a		-687 195
Camp site	3.96	15 012	3 787	0.72	20 909	-29 114
Trophy hunting	n/a			n/a	539 794	
Hunting	n/a			30.14	14 768	-490
Community trials	0.03	13 771	107 589	n/a		
Carpentry	7.19	16 412	2 284	n/a		

The method proved to be useful for the new community activities such as carpentry, camp site and community trials, which had detailed book keeping data for the community. However, the method was less useful in Okongo and Kwandu for agriculture, forestry, community group activities, community forestry and trophy hunting, which are less detailed and more general data. The method in this study did not give a clear answer to the question as to which one of the economic activities should be promoted. The reason for this might be that those data on agriculture, forestry, community group, community forestry and trophy hunting were less

specific than those of above mentioned three rural industries. Table 7.7 shows the net benefit – investment ratios for these enterprises. This study is not able to answer the question as to whether the expansion of one economic industry improves the situation at the expense of another. The different types of data and the design of the study did not allow this kind of comparison between these rural industries. For this type of comparison other methods such as social accounting matrices (Pyatt and Round 1979) would be more useful.

7.9 LABOUR PRODUCTIVITIES AND VALUE ADDED PER HECTARE FOR LAND USES OF OKONGO AND KWANDU

Labour productivities and value added per hectare for land uses of various rural industries in Okongo and Kwandu for the 2003–2005 period and the 2006–2008 period were calculated to compare the factors of production.

Labour productivities of the Okongo and Kwandu rural industries were calculated by dividing the net benefits by the labour days. In net benefits the costs excluded labour costs but also included other costs. The labour days were calculated by dividing the total labour costs of the specified rural industry by the daily rate of N$23.

Table 7.8 Mean labour productivity in Okongo and Kwandu in 2003–2005 and 2006–2008 periods.

Value added per hectare	Okongo 2003–2005	Okongo 2006–2008	Kwandu 2003–2005	Kwandu 2006–2008
Agriculture	16	16	14	14
Forestry	65	65	1493	1493
Community group	29	29	20	20
Community forestry	63	54	0	1
Camp site	14	36	23	19
Community trial	48	10	n/a	n/a
Carpentry	0	40	n/a	n/a
Trophy hunting	n/a	n/a	40	42

When comparing the mean labour productivities of Okongo and Kwandu in 2003–2005 and 2006–2008, the highest values in Okongo were those of forestry and community forestry (Table 7.8). Nevertheless, the value of community forestry decreased slightly between these two periods. In Kwandu, forestry and trophy hunting gave the highest values. Presumably one reason for the high values in forestry in Kwandu was the collection of non-wood forest products (e.g. medicinal plants), which yielded good profits for collectors.

Value added per hectare of land use of rural industries in Okongo and Kwandu were calculated (Table 7.9). The net benefits of rural industries were divided by the community forest area: 55 918 hectares in Okongo and 19 888 hectares in Kwandu.

Table 7.9 Value added per hectare of land use in Okongo and Kwandu in 2003–2005 and 2006–2008

Value added per hectare	Okongo 2003–2005	Okongo 2006–2008	Kwandu 2003–2005	Kwandu 2006–2008
Agriculture	-28	-24	-14	-12
Forestry	12	11	21	18
Community group	0.1	0.1	0.02	0.02
Community forestry	0.05	0.8	-6	-5
Camp site	0.02	0.05	0.1	-0.7
Community trial	0.01	-0.01	n/a	n/a
Carpentry	0	0.08	n/a	n/a
Trophy hunting	n/a	n/a	4	5

Community forestry in Okongo showed a marginal increase between these two periods. In Kwandu the value added per hectare of land use of trophy hunting increased marginally between these two periods.

7.10 CHANGES IN POVERTY IN OKONGO AND KWANDU COMMUNITY FORESTS IN THE 2006–2008 PERIOD

The changes in poverty in Okongo and Kwandu were measured by using the yearly net benefits. The household level poverty was clarified by using both the proportion of the total household expenditure on food method, and the cost of basic needs approach. The Okongo (2007) and Kwandu (2006) household surveys gave the household level information on poor and severely poor households.

Numbers, percentages and headcount indexes of the poor and severely poor households in Okongo and Kwandu were obtained by using the proportions of the total household expenditure on food method (See heading 2.1) are presented in Table 7.10.

Table 7.10 Poor and severely poor households in Okongo in 2007 and Kwandu in 2006 according to the proportion of the total household expenditure on food.

Poverty	Okongo			Kwandu		
Food expenditure rates	Number of households	%	Headcount Index (H)	Number of households	%	Headcount Index (H)
Poor	7	7	0.067	7	9	0.086
Severely poor	10	10	0.095	22	27	0.268
Total	105			82		

The number of severely poor households (> 80 per cent of the total expenditure on food) was higher than expected, both in Okongo and Kwandu. On the other hand, the percentages of poor households (60–80 per cent of the total expenditure on food) were lower. For comparison, the NHIES for 2003/2004 of the Ohangwena region reported 22.7 per cent of households were poor and 0.2 per cent were severely poor, and in the Caprivi region these corresponding values were 43.5 per cent and 7.1 per cent respectively. One can assume that in both communities the number of poor households had decreased and the number of severely poor households had increased since 2003/2004. Moreover, headcount indexes, which estimate the proportion of population living below a predetermined poverty line, show that the Okongo and Kwandu poor households are rather severely poor than poor. According to the food expenditure rate classification, Kwandu is clearly poorer than Okongo (Table 7.10).

The numbers of households, percentages and headcount indexes of the poor and severely poor in Okongo and Kwandu as obtained by using the cost of basic needs approach are presented in Table 7.11.

Table 7.11 Poor and severely poor households in Okongo and Kwandu according to the cost of basic needs approach in 2006.

Poverty	**Okongo**			**Kwandu**		
Basic need approach	Number of households	%	Headcount index	Number of households	%	Headcount index
Poor	1	1	0.010	8	10	0.098
Severely poor	5	5	0.048	21	26	0.256
	105			82		

When using the poverty definition for estmating the costs of the basic needs (See heading 2.1) and creating household level expenditure frames per person in Okongo, the number of poor decreased by 6 per cent and the numbers of severely poor people decreased by 5 per cent to that estimated by the food expenditure method. In Kwandu, the percentages of poor and severely poor households were nearly the same using both methods. Kwandu was also poorer than Okongo when measured by the cost of basic needs approach. When the results of these two methods were compared to the 2003/2004 regional poverty figures of Ohangwena, the Okongo households were found to be wealthier than the average Ohangwena household. When the same Kwandu results were compared to the Caprivi 2003/2004 poverty results, the poor group was much smaller and the severely poor group was much bigger in Kwandu than those in Caprivi.

When the headcount indexes in Okongo are considered for both methods, the headcount indexes were higher for the proportion of the total household expenditure on food method and the community was found to be poorer. In Kwandu,

the headcount indexes were quite close to each other for both methods. Using the proportion of the total household expenditure, on food method only a few households changed category from severely poor to poor households as was the case for the cost of basic needs approach method.

The group of the poor households was smaller in Okongo and Kwandu than expected whereas the group of the severely poor households was bigger. When reviewing the severely poor households as classified by the cost of basic needs approach in Okongo and Kwandu, it was noted that the households that had to rely on gifts had little or no livestock (Table 7.12).

Table 7.12 Livestock asset value per person in severely poor households in Okongo and Kwandu in 2006, N$.

Non-farming revenues	Percentage of 105 households, Okongo	Okongo, livestock value per person, N$	Percentage of 82 households, Kwandu	Kwandu, livestock value, per person, N$
Gifts	2	0	13	75
Salary	1	1 187	0	0
Business	2	951	5	859
Pension	0	0	4	277
None	0	0	2	659

It was difficult to draw any reliable conclusions between the livestock asset values of households and other revenue sources, because the data consisted of only a few households. However, Barret et al. (2001) have noted that only a few people collect revenues from one source, or hold their wealth in the form of a single asset, or use their assets for just one activity. Non-farm activities are positively correlated with revenue and wealth, especially in the form of land and livestock. In Okongo, the livestock was the main form of wealth.

The net benefit results for the years 2006 and 2008 were used for defining the changes in poverty in Okongo and Kwandu Community Forests. They consisted of the net benefits of agriculture (included home consumption), community forestry, forestry (included home consumption), community group activities, trophy hunting, hunting, home consumption of hunted prey, wildlife subsidy (HACSIS), carpentry, tourist camp site and community trials.

In Okongo, the total net benefits increased by N$60 694, about N$265 per household between the years 2006 and 2008, even though the total net benefits were negative (Table 7.13). The slight positive effect mostly came from carpentry and community tourist camp site activities. The total net benefit–cost ratios decreased 0.03 between the years 2006 and 2008 The benefit–cost ratios were 0.840 and 0.837 respectively.

When comparing both net benefits and net benefit–cost ratios of the Okongo rural industries for 2006 and 2008, it was noticed that none of the rural industries clearly

improved the economy in the community. Moreover, the benefits of community forestry decreased slightly between those years. Community forestry was not yet practiced in a way that it generated yearly, growing benefits. The poverty ratio in Okongo between the years and 2006 and 2008 was 0.08.

Table 7.13 A comparison of benefits, costs, net benefits and net benefit–cost ratios of the Okongo rural industries for 2006 and 2008, N$.

	2006				2008			
Okongo rural industries	**Benefits**	**Costs**	**Net benefit**	**Net B/C**	**Benefits**	**Costs**	**Net benefit**	**Net B/C**
Agriculture	2 936 288	4 328 092	-1 391 804	0.3	2 634 234	3 882 864	-1 248 630	0.3
Forestry	981 116	358 937	622 179	1.7	880 189	322 013	558 176	1.7
Community group activities	13 115	10 032	3 082	0.3	11 766	9 000	2 766	0.3
Community forestry	27 887	5 567	22 310	4	13 956	9 584	4 372	0.5
Community tourist camp site	6 510	1 959	4 551	2.3	10 671	3 272	7 399	2.3
Community trials	8 716	25 857	-17 141	0.7	44	36 657	-36 613	0.9
Carpentry	0	74	0	0	31 310	14 899	16 411	1
Trophy hunting	0	0	0	0	0	0	0	0
Total	3 973 632	4 730 444	-756 823	0.160	3 582 170	4 278 289	-696 119	0.163

The total net benefits for Okongo in 2006 and 2008 are presented in Figure 7.7.

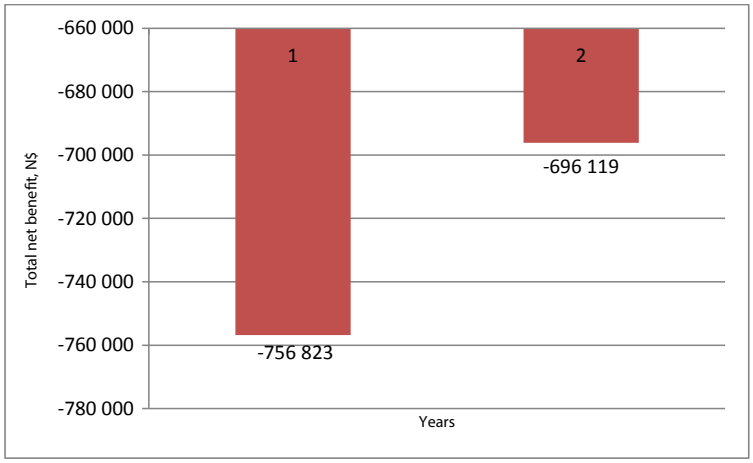


Figure 7.7. Total net benefits in Okongo for the years 2006 (1) and 2008 (2), N$. (Euro1 = N$10)

In Kwandu the total net benefits increased (N$65 791) between 2006 and 2008, which equaled about N$313 per household (Table 7.14). The total net benefit–cost ratios increased from 0.02 to 0.10 for the years 2006 and 2008. When comparing both net benefits and net benefit–cost ratios of the Kwandu rural industries in 2006 and 2008, it was noted that only trophy hunting clearly increased the economy of the community. The share of trophy hunting was almost five-fold in 2008 that of 2006. Community forestry stayed at the same modest level and did not produce positive benefits. The poverty ratio in Kwandu between the years 2006 and 2008 was 3.07.

Table 7.14. A comparison of benefits, costs, net benefits and net benefit–cost ratios of the Kwandu rural industries for 2006 and 2008. (Euro1 = N$10)

	2006				2008			
Kwandu rural industries	**Benefits**	**Costs**	**Net benefit**	**Net B/C**	**Benefits**	**Costs**	**Net benefit**	**Net B/C**
Agriculture	370 281	620 125	-249 844	0.4	332 190	556 333	-224 143	0.4
Forestry	527 171	159 935	367 236	2.3	472 941	143 483	329 458	2.3
Community group activities	10 923	10 538	385	0.04	9 800	9 454	346	0.04
Community forestry	7 712	110 883	-103 171	0.93	12 582	118 246	-105 664	0.89
Community tourist camp site	67 977	83 900	-15 923	0.19	41 287	54 478	-13191	0.24
Trophy hunting	131 528	105 087	26 441	0.25	277 296	161 759	115 537	0.71
Total	1 152592	1 090 468	25 124	0.02	1 146 096	1 043 753	102 343	0.10

Figure 7.8 also shows that the economy improved slightly in Kwandu between the years 2006 and 2008.

Community forestry had not had an effect on poverty alleviation in Okongo and Kwandu at the end of the budget year 2008/2009. However, it is obvious that in Kwandu the wildlife sector will have an important role in poverty alleviation in the future, especially when the revenues are shared between households. Forests play an important role as the habitat of fauna and flora in game husbandry, which gives an important subsiduary role for community forestry in poverty alleviation in Kwandu. Possibly this will also be the case for Okongo in the future.

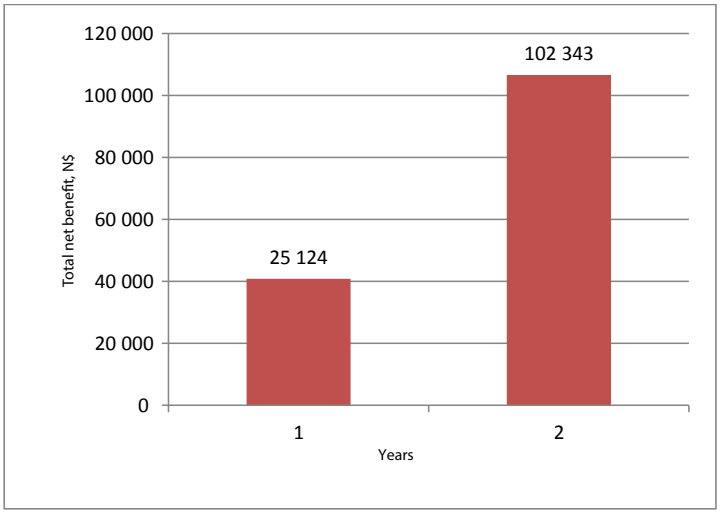


Figure 7.8 Total net benefits in Kwandu for 2006 (1) and 2008 (2), N$. (Euro1 = N$10)

7.11 REDD-PLUS, PES OR STATE SUBSIDY AS AN INSTRUMENT FOR SUSTAINABLE FOREST MANAGEMENT

In Okongo Community Forest area, which is 55 918 hectares, the forest density was 43.2 m^3/ha, which equates to 34.6 tonnes/ha[108] of biomass by using the factor 0.8 (Odendaal et al. 1983). The carbon content is estimated to be 50 per cent of the total biomass when a factor 0.5 (Birdsley 1996) is used. This gives the carbon density for forestry of 17.3 tC/ha in Okongo[109,110]. In Okongo forests cover 75 per cent of the total area, pastures 19 per cent[111] and crop land[112] 6 per cent (Table 7.15).

Table 7.15 Carbon storages for forestry, pasture and crop land in Okongo Community Forest in 2006.

Land use	%	Ha	tC/ha	Carbon storage, tC	Price, N$/tC	Value of carbon storage, N$	Price, N$/ CO_2e
Forestry	75	42 357	17.3	732 776	6.4	4 689 766	23.5
Pasture	19	10 625	0.725	7 703	n/a	n/a	n/a
Crop land	6	2 936	2.65	7 780	n/a	n/a	n/a
Total		55 918		748 259			

108 This is close to the deciduous woodland (35.2 Mg/ha).

109 For pastures 1.45 Mg/ha was used, which is the mean for open grass with sparse shrubs (1.0 Mg/ha) and open grassland (1.9 Mg).

110 For crop land 5.3 Mg/ha was used.

111 Moderate grazing 7 331 ha, intensive grazing 1 594 ha and no grazing 1 700 ha.

112 Maize 5 per cent (142 ha), millet 90 per cent (2 641 ha) and sorghum 5 per cent (153 ha).

Two options for Okongo Community Forest for the 2006–2016 period are presented in Table 7.17. In the first option the Okongo community forest has kept its forest area in the same condition as that in 2006, and avoided deforestation, forest degradation and land use conversions. The forest cover is assumed to stay the same. The Community Forest has been engaged in REDD plus, PES project funding or received a state subsidy to follow sustainable forest management. The second option assumes the Namibian mean deforestation rate per year of 0.84 per cent, which indicates that in 10 years the forest production area in Okongo will have decreased from 42 357 ha to 38 930 ha. The forest cover is degraded 0.5 per cent per year of the total value and the conversion is to agriculture, even though the Okongo soils are quite poor and water resources are limited. The Okongo Community Forest will not have followed the sustainable forest management under this option.

According to the community bookkeeping records the total benefit of the Okongo community forest area activities i.e. community forestry and home consumption of community member was N$1 009 003 (N$24/ha) in 2006 (Table 7.16). The total costs were N$364 504 (N$9/ha).

Table 7.16 The net benefit calculations of forestry in Okongo and Kwandu for 2006, N$. (Euro1 = N$10)

	Benefits; community forestry, N$	Benefits; home consumption of community forest, N$	Total benefits of forestry, N$	Benefits/ ha, N$	Cost; community forestry, N$	Costs; home consumption of community forest, N$	Total costs of forestry N$	Costs/ ha, N$	Net benefit, opportunity cost, N$
Okongo	27 887	981 116	1 009 003	24	5 567	358 937	364 504	9	15
Kwandu	7 712	439 175	446 887	39	110 883	160 235	271 118	23	16

The net benefit i.e. the opportunity cost per hectare in Okongo in 2006 was N$15. When this figure was converted to over a 10-year period by using an interest rate of 6 per cent, a cost of NS110 per hectare was obtained. The cost of REDD (6.4 N$/tC) was calculated by dividing the cost of maintaining the forest of N$110/ha by the carbon density of 17.3 tC/ha.

The difference between these two options in Okongo for the years 2006–2016 is N$2 108 814, which is N$9 209 per household (Table 7.17). This is N$921 per household per year, which is the least amount to be covered by REDD plus, other PES-tools or by state subsidy to act as an incentive for the community forest households to avoid deforestation and forest degradation.

Table 7.17 Options for Okongo Community Forest for 2006–2016. (Euro1 = N$10)

	Forest area, ha	Maintaining forest for 10 years, N$/ha	Cost of REDD, N$/tC	Carbon storage, tC	Value of carbon storage, N$
Option 1, 2006	42 357	110	6.4	732 776	4 689 766
Option 2, 2016	38 930	66	3.8	673 489	2 559 258
Difference	3 427	44	2.6	59 287	2 130 508

The value of compensation is one third (33 per cent) of the total forest net revenue (N$2 800) per household per year in 2006. The compensation might motivate the Okongo households to conserve their forest area in the same condition.

In Kwandu Community Forest area, which is 19 888 hectares, the forest density is 23.1 m^3/ha, which equates to 18.5 tonnes/ha of biomass. The carbon density of forestry in Kwandu is thus estimated to be 9.24 tC/ha. The forestry area is 58.2 per cent of the total community forest area (11 575 ha). The cost of REDD (12.7 N$/tC) was obtained by dividing cost for maintaining the forest for 10 years by the carbon density.

The two options for Kwandu Community Forest for the 2006–2016 period are presented in Table 7.18, as in the Okongo case. The difference between these two options is N$650 514, which equals N$3 098 per household. This is N$310 per household per year.

Table 7.18 Options for Kwandu Community Forest for 2006–2016. (Euro1 = N$10)

	Forest area, ha	Maintaining forest for 10 years, N$/ha	Cost of REDD, N$/tC	Carbon storage, tC	Value of carbon storage, N$
Option 1, 2006	11 575	118	12.7	106 953	1 358 303
Option 2, 2016	10 639	66	7.2	98 304	707 789
Difference	936	52	5.5	8 649	650 514

The mean net forest revenues i.e. community forestry and home consumption per household in Kwandu in 2006 was N$837 (Table 7.16). The calculated compensation would be about one third (37 per cent) of it, as in Okongo.

The REDD plus, PES or state subsidy in Okongo and Kwandu Community Forests could be based on the mean yearly forest net benefit per household, including community forestry activities and forest home consumption of households. The compensation could be paid as a certain percentage of this mean forest net revenue per household, presumably between 10 and 60 per cent, depending on the situation in the community and objectives of the action. This incentive should be paid according to the community's performance in community forestry, in avoiding deforestation, forest degradation and land use conversions.

8. DISCUSSION

The first objective of this study was to define the role of community forestry in net benefit generation for the two study areas of Okongo and Kwandu by comparing it to other rural industries which were; agriculture, forestry, wild-life and eco-tourism by using cost–benefit analysis, net benefit–cost ratios and net benefit–investment ratios. In addition labour and land productivities were calculated for these rural industries. Community forestry was found to be diversifying the livelihoods in Okongo and Kwandu.

The overall hypothesis of the study was: the role of forestry in benefit generation in communities, especially home consumption is under-estimated. Home consumption of forestry was a major part of forest production. This was especially the case in Kwandu where forestry was found to be more important for revenue generation than agriculture. The cost–benefit analyses of both Okongo and Kwandu showed that the labour input in the fields and forests of community members was significant but the profitability especially for crop production could be questioned in some cases.

The hypothesis in Phase I (2003–2005) was that the output of forest was below its potential even though home consumption of forest products was significant. The volume and value of the wood and non-wood products for home consumption was found to be considerable. Even if only the sales, which were modest were reported as the forest revenue, one could say that the role of forest and the value of forest products had been clearly under-estimated. The community forest area was used as a source of daily consumption of forest products. For the poor the other rural industries were expected to be more important than forestry. According to community interviews held in Okongo and Kwandu in 2009, agriculture, especially crop production, was the most important activity for the community members. Food production was regarded as a vital activity for households. However, the study showed that the severely poor households did not have livestock or other assets for agricultural production. The findings of the study showed that the non-wood products were also important sources of livelihood in the study areas.

In Phase II (2006–2008) the communities were granted legal rights in order to generate revenue from their own forest resources. The hypothesis was that: the role of forest is more significant for the economy of the community. The poor were expected to start receiving benefits through the forest revenue distribution. In this phase, community members already had more information about their community forest resources in the form of a forest management plan, benefits and possibilities of community forestry. The community forest was a permanent natural resource asset.

At the end of the budget year of 2008/2009 community forestry was already well-established in both communities but its activities had not become lucrative.

However, the community forest provided work and incomes for some of the community members. One could say that at the end of the budget year 2008/2009 (i.e. the third year) community forestry had some positive role in regard to improving minor revenues and incomes in Okongo and Kwandu communities. Moreover, the community forestry industry had not yet become a functioning tool in poverty alleviation. The poor were not receiving any advantages of community forestry e.g. through forest revenue distribution. The collection of non-timber forest products was common, especially in Kwandu where one third of households were severely poor. This is in line with the assumption of Byron and Arnold (1999) that poor households are more dependent on non-timber forest products (NFTPs). Community forestry, as it is practised now in Okongo and Kwandu, will not help the poor people to rid themselves of poverty but it can start to give some support to their daily lives. Poverty alleviation would need more revenue sources to be generated from the community forest area and for their subsequent equal distribution to all the households of the community.

The features and uses of the methods used in the study were appraised. The CBA method was used to compare the economic effects of agriculture, forestry, eco-tourism and wildlife, and to clarify poverty alleviation in Okongo and Kwandu. The CBA-method seemed to be suitable for this kind of community level research. However, the method has clear weaknesses, which have to be taken into account when the method is used for the community level. First, benefits and costs must be estimated accurately. When using the shadow prices some subjectivity in prices can exist, and non-monetary values are often used at the community level. Furthermore, the available data can be limited at the community context level. Even local language differences can cause inaccuracies in interviews to occur. Moreover, concepts can be misunderstood by community members or interviewers, and they might not be commensurate with that intended, which can lead to incorrect conclusions or concepts. Second, one should pay attention to the discount rate so that it correctly reflects the community development. This study used the @RISK program for sensitivity analysis. The discount rates ranged between 1–10 per cent in order to investigate how the size of discount rate changes that of the total net benefits. Third, the generalization of results could produce some problems since the communities do differ from each other. However, CBA is practical as it considers the form of the available data existing in communities, and it is easily repeated in a similar small unit such as a community. Fourth, the existence of community level data gives basic requirements for the community. Therefore, a basic education and a further training in bookkeeping are both needed. The CBA method seems to be transparent and understandable from the point of view of community members. The method of collection should be as simple and easy to explain as possible. This transparency and ease of understanding is important when the communities are involved in data collection. The personal interest of the community members in the results and how

these are used guarantees co-operation *inter alia* in data collection. These kinds of community level data are difficult or even impossible to get without successful cooperation with the community. These criteria help ensure that the method is reliable enough for an economic study but do not quarantee it.

In the study the net benefit–cost ratios, which describe the relative profitability, clearly showed the economic changes in the community development as manifested by increased costs. The benefit–cost ratios indicate how high these costs can be. However, one should note that the values of the benefit–cost ratios vary according to the interest rate chosen. The study also used the NBIR to compare economic activities in Okongo and Kwandu. This method took into account the costs of investments that preceded later benefits. Land and labour productivities of the rural industries were compared in more detail over two time periods. Neither land nor labour production changed very much between these two time periods. Therefore it is very difficult to make any clear conclusions based on these land and labour productivities.

The second objective was to define the importance of community forestry as a driver for poverty alleviation. The study showed that community forestry was not a solution for poverty alleviation in Okongo and Kwandu. It only improved the livelihoods marginally. It was noticed that both communities, Okongo and Kwandu, started to orient themselves towards community forestry immediately after being granted the legal rights of community forest in 2006. This orientation was faster in Okongo than in Kwandu. The Okongo Community Forest was more active in the first three years, whereas the Kwandu forest community remained more as a conservancy community. In both communities the earlier projects of 1998–2005 had built a skills platform for the community forest and conservancy activities through training for such skills as: bookkeeping management of systems and making investments in *inter alia* office and community tourist camp site constructions. Therefore the communities did not start the community forestry activities entirely from zero in 2006. If Okongo and Kwandu did not have this kind of project background, the start of the community forestry activities might have been slower. The time frame (2006–2008) was the minimum for studying poverty change, and in practice too short to see any significant change in poverty levels. The poor had not started to receive benefits through the forest revenue distribution. However, the poverty calculation gave a basis for further studies. McDermott (2009) noted earlier that community forestry reduces poverty only when it adopts a specific goal to get benefits. Dahal's (2006; 2007) studies showed that the effect of community forestry was not positive among the poorest. Bhattarai and Ojha (2001) also noted the same and that the poor were not taken into account in community forest decision making.

When the dividend distribution resulting from community forestry is considered, the net benefits in Okongo and Kwandu were too low in 2006–2008 to make a significant positive impact. The communities could pay the salaries of Forest

Management Committee members and other fees and the payments to the Traditional Leaders but could not distribute dividends to ordinary households. The FMC members were paid quite regularly. However, one could question whether the FMC should be paid automatically according to their status or rather according to the accomplished output or performance of their management. Community forestry complemented the forestry activities of the households in Okongo and Kwandu and marginally improved the livelihoods of the community population. Community forestry brought in some extra revenues to some households from the beginning and possibly in the future will bring some modest yearly revenues to all the households.

The economic situation of the poor Okongo and Kwandu households might be more difficult than is apparent. On the basis of household surveys alone it is not possible to conclude if HIV/AIDS has been adding to the group of the severely poor. This might have been the case in practice. According to the Okongo and Kwandu household surveys the poor households had more severely poor than poor. In Kwandu as much as one third of the households were severely poor, as measured by the proportion of the total household expenditure on food and by the cost of basic needs methods. In Okongo the situation of the severely poor was not as extreme. However, the Okongo household survey also included some families, which had only a few household assets with a total value of less than N$30 (Euro3) per person and no livestock, not even a chicken. Nevertheless, the Kwandu households were still clearly poorer than the Okongo households.

In the poverty analyses the small sample size most probably caused some unreliable results when the proportion of the total household expenditure on food method was used. A household was classified as being severely poor using the cost of basic needs approach. However, the same household could be classified as well-off according to the proportion of the total household expenditure on food method when it allocates only 40 per cent of its total expenditure on food. Nowadays, the share of other expenditures, especially school fees is also important in the poor households when they struggle against poverty. The cost of basic needs approach is a more appropriate method for poverty analyses in Namibia.

The third objective was to show the general trends of community development upon agriculture, forestry, wildlife and eco-tourism. When rural industries, agriculture, forestry, wildlife and eco-tourism in Okongo and Kwandu were reviewed for their revenue generation, the two communities proved to be quite different. Okongo was livestock oriented whereas Kwandu was wildlife oriented. However, agricultural and forest home consumption formed the major part of the household revenues in both communities and were important in the everyday lives and livelihoods of the households. When the general economic trends of different rural industries of Okongo and Kwandu in the 2003-2008 period are considered and home consumption and labour costs in agriculture, forestry and community group activities were all taken into account, the total net benefits were negative for Okongo

and marginally positive for Kwandu. The main reason for these negative results was related to agriculture, namely labour costs of the labour-intensive subsistence agriculture. The productivity is low due to the predominant climatic conditions and the agricultural technologies used. According to Teweldmehidin and Conroy (2010) many farmers in Kwandu prefer manual labour as they do not wish to risk their limited resources on technology. Poverty alleviation and increased agricultural production are also major challenges to Namibian land reform in communal areas where subsistence agriculture is widely practiced. The aim is to have improved agricultural technologies with larger field areas and also secure land tenure.

The study analysed how the profitability of forestry changed when the communities started to benefit from their own forest resources. The home consumption of forestry output, proved to be the basis of the household economy in both Okongo and Kwandu. The households of both communities used the community forest area for their daily consumption of forest products, such as firewood and poles. Although this collection was quite extensive, it was also sustainable for it concentrated on dead trees and did not reduce the number of live trees in the community forest area. Both studied communities used their forest resources carefully. The management plans guaranteed the sustainable use of the forest area in both communities. Over the 2006–2008 period Okongo and Kwandu did not use their maximal annual-cut quotas. The Okongo and Kwandu community forests also served as an operational environment for the other rural industries; for livestock rearing in Okongo and for wildlife management in Kwandu.

When the labour costs of agriculture, forestry and community group activities were not taken into account, the total net benefits were positive and much higher in both communities, especially in Okongo. This difference showed that the sum values of labour inputs in agriculture, forestry and community group activities of community members were significant, and should be taken into account in future economic reviews and would be expected to have opportunity costs.

Over the 2003–2005 period the Okongo and Kwandu communities tried to diversify their rural industries with the help of development aid projects. The project support was a good and risk-free way to introduce new community activities and to test their viability in the predominant local conditions. The new activities usually need new skills, equipment and the support of extension staff, which can be provided by projects. The Okongo community had good extension support as one project staff person stayed for extended periods in the community, which allowed the new activities to be facilitated at the pace of the community. The new rural industries that were introduced to Okongo and Kwandu in the 2003–2007 period also brought some revenues to the communities in the 2003–2008 period. The initial phase of establishing an activity into the Okongo and Kwandu communities took a mean of five years. Trophy hunting in Kwandu became a normal community activity and also a rural industry within 10 years. The critical phase was when the community had to

start to look after the activities itself. In Kwandu this phase manifested as hesitation in decision-making and as a perception of the fragility of underlying community economy. In Okongo and Kwandu the share of eco-tourism was still modest but was seen as a future revenue source. In such communities the same area can be used for forestry, livestock, eco-tourism, game meat production or trophy hunting.

This study did not have any control groups for Okongo and Kwandu, and that is why it is not able to answer the question of how the economy had developed in these communities without community forestry over the 2006–2008 period. The fundamental reason for not having control groups was that in the 2006–2007 period only these two communities in Namibia were able to provide the necessary community level forestry data to the extent that was needed.

According to the findings of the Okongo and Kwandu Household Surveys, Okongo is presumably a quite wealthy area in terms of its cattle holdings. Against this light the term Okongo's poverty could even be questioned to some degree though cattle has other non-pecuinary values in this area than solely providing a revenue (e.g. cultural traditions and dowry), thus a large part of the cattle resource is not intended only for household revenue and consumption. If Okongo diversifies the rural industries towards game husbandry, the cattle must be taken into account in conservancy activities. One should also note that in the rural areas of Namibia non-farm revenues (salaries and wages) account for about 46.3 per cent of the total revenues of a household. This percentage might be higher in Kwandu where agriculture and forestry are not as important as in Okongo.

The fourth objective was to find ways to sustainable management of the fragile but valuable community forest areas and poverty alleviation needs to be considered. The REDD-plus, PES or state subsidy payment systems could be options for encouraging the communities to carry out better forest management and make reductions in deforestation, by acting as an incentive for sustainable forest management. Community forests such as those in Okongo and Kwandu also have other activities in addition to pure forestry in the community forest area such as grazing and game husbandry. Therefore the community members of such forests should take into account the sustainable use and conservation of the community forest area holistically. The compensation, in the form of a REDD-plus payment, an environment service payment or a state subsidy, could make the community members promote the avoidance of overuse and increase the conservation efforts of their community forest areas. These types of payments should be based on proven results in avoiding deforestation, forest degradation and land use conversions in community forestry.

The community forest gazettement of Okongo and Kwandu, being a legal declaration, gives some impetus against conversions e.g. from forest to crop land. Despite this community forest gazettement does not in itself guarantee that the community forest area stays as a forest forever especially when the community

does not manage it sustainably. The Government of Namibia can withdraw the community forest rights from the communities, if the community forest is not managed according to the forest management plan. However, the community forestry areas are assumed to be permanent in Namibia. Notably a balance will be needed in the community forest area, if other rural industries are also practiced as in Okongo and Kwandu. A community forest should lead to sustainable use of its natural resources and the best possible economic combination of revenue sources.

In Namibia there is a lack of community level economic data. One could expect that this kind of study will be repeated in Namibia in the coming years, especially when the follow-up of poverty alleviation and the development of community forestry in these communities are considered. The two communities of Okongo and Kwandu had earlier project histories that lasted for some years. Those projects had used quite a lot of funds for training, including bookkeeping. These skills background created the possibility to have this economic yearly time series on forestry and conservancy activities. The importance of this study was to provide basic economic information for the development of community area forests; specifically community forests in semi-arid conditions, that takes into account poverty alleviation and sustainable forest management.

9. CONCLUSIONS / RECOMMENDATIONS

Home consumption of products proved to be an important part of the agricultural and forestry output in Okongo and Kwandu. It constituted nearly all of the production. However, the manual agricultural technologies kept the production levels low, and the community members did not get adequate compensation for their labour inputs from the crop fields. This study suggests that labour costs of the community population should be taken into account in economic analyses. Moreover, this should be done even if the shadow wage rate is elaborated as a certain percentage of a farm worker's daily salary. This would prevent the overestimation of benefits in agricultural or forestry production in communal forestry areas such as Okongo and Kwandu, and enable the comparison between different rural industries possible and even feasible.

The results of this study were in line with earlier information and research on the livelihoods in these two communities and regions. Animal husbandry was a more important source of livelihood in Okongo than in Kwandu. In addition, wildlife husbandry was a growing sector in Kwandu. However, the number of severely poor households was found to be higher than expected in both communities. There were a few households in both Okongo and Kwandu with a very low household asset value or actually no household assets at all, and the same households had literally little or no livestock. Their household food expenditure per person was very low. These households were severely poor when classified according to the cost of basic needs approach. More than one criterion confirmed the poor economic status of the household. For example, a lack of household assets, no livestock with a low food expenditure per person. It can be assumed that under Namibian conditions the household asset value, the number of livestock in the household, the value of food expenditure per person, other revenues of the household including salaries, pensions and gifts, and other expenditures such as school fees should be taken into account when poverty is defined in rural areas. The focus in poverty studies should be on poverty alleviation. This study did not show if the poverty decreased in these communities between 2006 and 2008. Specifically, whether the poor had received any profits from community forestry. The net benefits from community forestry were too low to be distributed to community members. The time frame of the study was also too short for this kind of change to be detected. Another household survey is needed to be carried out for this objective, which takes into account if the effect of community forestry is positive among the poor.

As to future research, a repetition of the Okongo and Kwandu Household surveys would give valuable information on the poverty changes in these two communities. The change in poverty could be measured as the difference between two such surveys.

The interval between the surveys could be ten years. The Okongo and Kwandu household surveys should be repeated using the same households and using the same questionnaire. However, the costs and the time spent on different activities of different rural industries should be added to the questionnaire. Some other specific questions on community forestry should also be added. The household level questions should concentrate on 1) the mean monthly income (salary), 2) the time lived in the community forest area, 3) the participated activities, and 4) whether the marginalised groups are better off than before. At the community level, the questions could focus on 5) how closely the annual allowable cut follows the forest management plan, 6) how much is harvested yearly within the allowable annual cut, 7) how much revenue the community has generated from community forestry and 8) with what costs, and 9) how the revenue is distributed at the household level.

The study showed that new community activities need time to be stabilized and to become established permanent in the communities. They also often need investments and the population training before the activities can be started. The initial phase of a new activity takes about five years, and about 10 years before it becomes a viable and permanent activity in the community.

In community forests the REDD-plus payment or a similar type of incentive could be useful in directing community forestry towards sustainability and preventing forest degradation and deforestation in community forest areas. The attention of community members could be drawn towards promoting conservation and sustainable use by implementing these incentives. The funding could come from an international source or from the Government of Namibia, if international funding is not possible. Although REDD-plus activities are supposed to be directed to areas under significant threats of deforestation, other value of forests including fragile and environmentally valuable forests should also be taken into account even if it is only their carbon stocks that are low. The multiple-use of forests and rural livelihoods should also be recognized against the climate change setting. Community Based Natural Resource Management gives a suitable framework for these activities in Namibia.

When it has been managed sustainably, when its memberships handled equitably and when revenues are distributed to the members in a fair way, community forestry would be a good long-term solution for managing the fragile communal area forests in Namibia. It can also improve the livelihoods by generating some extra revenues for all households. However, the combination of community forestry and conservancy could be more sustainable under Namibian conditions of sustaining existing fragile forests and wildlife in game areas. The two rural industries can complement each other in the development process of the community, especially during the critical phases. The diversified revenues would come from different sources. At the moment, the Okongo and Kwandu communities manage their community forests according to their respective management plans. In coming years when the community has most

probably received regular revenues from community forestry and / or conservancy, the communities can start to develop and invest in their common community activities (e.g. a community lodge).

REFERENCES

ADB. 2006. Republic of Namibia. Country Gender Profile. African Development Bank. 59 + 13 p.

Agrawal, A. 2007. Forests, governance and sustainability, common property theory and its contributions. International Journal of the commons 1 (1): 51–76.

Agronomic Board. 2007. Annual Report 1 April 2006 – 31 March 2007. No. 20. Windhoek, Namibia.

Angelsen, A., Brockhaus, M., Kanninen, M., Sills, E., Sunderlin, W.D. & Wertz-Kanounnikoff, S. (eds). 2009. Realising REDD+. National strategy and policy options. The Centre for International Forestry Research (CIFOR). Bogor, Indonesia. 363 p.

Angombe, S., Selänniemi, T. & Chakanga, M. 2000. Inventory Report on the Woody Resources in the Okongo Community Forest. Ministry of Environment and Tourism, Directorate of Forestry. Windhoek, October 2000. Namibia. 60 p.

Bandyopadhyay, S., Guzman, J.C. & Nangulah-Lendelhoh, S. 2007. Communal Conservancies and Household Welfare in Namibia. October 25, 2007.

Barnes, J.I., Nhuleipo, O., Muteyauli, P.I. & MacGregor, J. 2005. Preliminary economic asset and flow accounts for forest resources in Namibia. DEA Research Discussion Paper, Number 70, June 2005. Environmental Economics Unit, Directorate of Environmental Affairs, Ministry of Environment and Tourism. Nambia. 20 p.

Barnes, J.I. 2001. Economic returns and allocation of resources in the wildlife sector South African Journal of Wildlife Research 31 (3&4): 141–153 (2001).

Barnes, J., Cannon, J. & Morrison, K. 2001. Economic returns to selected land uses in Ngamiland, Botswana. Unpublished Report. Conservation International. 165 p.

Barret, C.B., Reardon, T. & Webb, P. 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics and policy implications. Food Policy 26 (2001) 315–331.

Barton Bray, D., Duran, E., Ramos, V.H., Mas, J.F., Velaquez, A. & McNab, R.B. 2008. Tropical deforestation, community forests and protected areas in the Maya Forest. Ecology and Society 13 (2), 56.

Bhattarai, B. & Ojha, H. 2001. Distributional impact of community forestry: who is benefiting from Nepal's community forests? NepalNet.

Birdsley, R.A. 1996. Regional Estimates of timber volume and forest carbon for fully stocked timberland. Average management after final clear cut. Volume 2, Forest Management opportunities for mitigating carbon emissions.

Boardman, A.E., Greenberg, D.H., Vining, A.R. & Weimer, D.L. 2006. Cost–Benefit Analysis, Concepts and Practice. Second Edition. Prentice Hall, Upper Saddle River, New Yersey, USA. 526 p.

Bond, I., Grieg-Gran, M., Wertz-Kanounnikoff, S., Hazelwood, P., Wunder, S. & Angelsen, A. 2009. Incentives to sustain forest ecosystem services; a review and lessons for REDD. Natural Resources Issues No. 16. International Institute for Environment and Development, London with CIFOR, Bogor, Indonesia and World Resources Institute Washington, DC. 47 p.

Brainard, L., Jones. A. & Purvis, N. 2009. Climate Change and Global Poverty. A billion lives in the balance? Brookinhs Institution Press. Washington D.C. 299 p.

Brouwer, R. & Pearce, D. 2005. Cost–Benefit Analysis and Water Resources Management. Edward Elgar Publishing. Northampton, USA. 404 p.

Brown, D., Seymour, F. & Peskett, L. 2008. How we achieve REDD co-benefits and avoid doing harm? In: Angelsen, A. (ed.) Moving ahead with REDD: Issues, options and implications, pp. 107–118. CIFOR, Bogor, Indonesia.

Byron, R.N. & Arnold, J.E.M. 1999. What futures for the people of the tropical forests? World Development 27 (5), pp. 789–805.

Campbell, H. & Brown, R. 2009. Benefit–Cost Analysis, Financial and Economic Appraisal using Spreadsheets. Cambridge University Press. Melbourne. 345 p.

Chapra, K. & Dasgupta, P. 2008. International Forestry Review 10: (2): 376–386. Assessing the Economic and Ecosystem Services Constitution of Forests: Issues in Modeling, and an Illustration.

Chhatre, A. & Agrawal, A. 2009. Trade – offs and synergies between carbon storage and livelihood benefits from forest commons. PNAS. October 20, 2009. Vol. 106, no. 42. pp. 17667–17670.

Collier, P. 2007. Poverty Reduction in Africa. Centre for the Study of African Economies, Department of Economics, University of Oxford. Oxford. UK. 17 p.

Dahal, M.R. 2007. Externality Analysis of Community Forest Management. The Third Pole Vol. 5–7. pp. 62–69.

Dahal, M.R. 2006. Benefit–Cost Analysis of Community Forest and its Distributional Impact on Rural Poor. Economic Journal of Nepal Vol. 29 No 2.

Dasgupta, A.K. & Pearce, D.W. 1972. Cost–Benefit Analysis. The MacMillan Press. UK. 270 p.

Datt, G. & Ravallion, M. 1992. Growth and redistribution components of changes in poverty measures: A decomposition with application to Brazil and India in the 1980s. Journal of Development Economics 38 (2): 275–295.

Dhongde, S. & Minoui, C. 2010. Global poverty estimates; Present and future. The University of Manchester. Brooks World Poverty Institute. 30 p.

Diggle, R. 2008. Personal communication.

Donnelly, R.E., Katzner, T., Gordon, I.J., Gompper, M.E., Redpath, S., Garner, T.W., Altwegg, R., Reed, D.H., Acevedo-Whitehouse, K. & Pettorelli, N. 2011. Animal conservation, Volume 14, Issue 4, pp. 325–327, August 2011.

Eckstein, O. 1958. Water Resource Development: The Economics of Project Evaluation. Cambridge. MA. Harvard University Press.

Eliasch, J. 2008. Climate Change: Financing Global Forests. The Eliasch Review. Earthscan, UK. 264 p.

Erkkilä. A. 2001. Living on the land: Change in forest cover in North-Central Namibia 1943–1996. Silva Carelica 37. University of Joensuu, Faculty of Forestry, 188 p.

Erkkilä, A. & Siiskonen, H. 1992. Forestry in Namibia 1850–1990. Silva Carelica 20. University of Joensuu. 246 p. EU.2011. www.eurofound.europa.eu

FAO. Definition of a Farming System. www.fao.org/farmingsystems/description_en

FAO. 2010. Food and Agriculture Organization of the United Nation's Global Forest Resources Assessment 2010. www.fao.org/forestry/fra/fra2010en

FAO. 2005. Forest cover, Forest types, Breakdown of forest types, Change in Forest cover, Primary forest and Forest designation. Food and Agriculture organization of the United Nation's Global Forest Resources. Assessment 2005. www.fao.org/forestry/fra2005

FAO. 1997. State of the world's forests. Food and Agriculture Organization. Rome. 201 p.

Freeman, R. 2008. Labour productivity indicators. Comparison of two databases productivity differentials and the Balasse Samuelson Effect. Organisation for economic co-operation and development. 76 p.

Griffiths, T. 2007. Seeing 'RED'? Avoided deforestation and the rights of indigenous peoples and local communities. Forest Peoples Programme, Moreton-in-Marsh, UK. http:/www.forestpeoples.org/

Gittinger, J.P. 1982. Economic Analysis of Agriculture Projects. EDI Series in Economic Development, Second Edition. The Johns Hopkins University Press. Baltimore USA. 506 p.

Hanley, N. & Spash, C. 1993. Cost–Benefit Analysis and the Environment. Edward Elgar. UK. 278 p.

Hari, P. & Kulmala, L. 2009. Boreal Forest and Climate Change. Advances in Global Change Research 34. Springer. 582 p.

Haynes, R., McCool, S., Horne, A. & Birchfield, J. 1996. Natural resource management and community well-being. Wildlife Society Bulletin. Vol.24. No 2. pp. 222–226.

Hayes, T. & Persha, L. 2010. Nesting local forestry initiatives: Revisiting community forest management in a REDD+ world. Forest Policy and Economics. www.elsevier.com/locate/forpol. pp. 545–553.

Hepburn, C.J. & Koundouri, P. 2007. Recent advantages in discounting: implication for forest economics. Journal of Forest Economics 13: (2–3), pp.169–189.

Hicks, J.R. 1939. Foundations of welfare economics. Economic Journal. Vol 49 No 195.

IECN. 2008. Namibian National Issues report on land use, land use change and forestry. Intergrated Environmental Consultants. Namibia. 18 p.

IPPC. 1997. IPPC fourth assessment report. Report by working group 1. The physical science basis. Cambridge University Press, Cambridge, UK.

IUCN. 2007. Forests and livelihoods. Reducing emissions from deforestation and ecosystem degradation (REDD). Climate change briefing. The World Conservation Union. December 2007. 2 p.

Jagger, P., Sills, E.O., Lawlor, K. & Sunderlin, W.D. 2010. Occacional Paper 56. CIFOR, Indonesia. 93 p.

Jogo, W. & Hassan, R. 2010. Agrekon Volume 49, Issue 2, 2010. pp. 195–216.

Johansson, P-O. 1993. Cost–benefit analysis of environmental change. Cambridege University Press. UK. 232 p.

Jones, B. & Barnes, J. 2009. Preparing for REDD in dry land forests; Investigating the options and potential synergy for REDD payments in the miombo eco-region. Namibia Country Study. Windhoek, June 2009. International Institute for Environment and Development and Department for International Development. 50 p.

Kaldor, N. 1939. Welfare propositions in Economics and Interpersonal Comparisons of Utility. Economic Journal Vol. 49 No 195.

Kamwi J. 2003. Ministry of Environment and Tourism, Directorate of Forestry. Woody Resources Report of Kwandu Community Forest. Jonathan Mutau Kamwi. Namibia-Finland Forestry Programme. Windhoek, June 2003. 23 + 2 p.

de Klerk, J.N. 2004. Bush encroachment in Namibia. Report on Phase 1 of the Bush Encroachment Research, Monitoring and Management Project. Ministry of Environment and Tourism, Namibia. 255 p.

Krutilla, J.V. & Eckstein, O. 1958. Multiple Purpose River Development: Studies in Applied Economic Analysis. Baltimore, Maryland. Johns Hopkins Press.

LaRRI. 2008. The Namibian Wage Bargaining & Directors' Remuneration Report 2007. 8 % For Workers – 37 % for the Boss. Labour Resource and Research Institute, Windhoek. 23 p.

Levine, S. & Roberts, B. 2008. Dynamics of Income Inequality and Poverty in Post-Independence Namibia. UNU-WIDER Conference Frontiers of Poverty Analysis 26–27 September 2008. Helsinki. 40 p.

Lund, J.R. 1992. Benefit–Cost Ratios. Failures and Alternatives. Journal of Water Resources Planning and Mangement. Vol. 118 no (Jan 1992). 94 p.

Martin R.B. 2006. Wildlife Co-Management in the Kwando Area of the Caprivi. A study for the Ministry of Environment and Tourism and the Management Committee of the Mudumu North Complex.

MAWF. 2005. Ministry of Agriculture, Water and Forestry, Directorate of Forestry. Community Forestry Guidelines. Windhoek. Typoprint. 70 p.

McDermott, M.H. 2009. Equity in community forestry: insights from North and South. International Forestry Review 11 (2): 157–170, 2009.

McKean, R.N. 1958. Efficiency in Government through Systems Analysis. Wiley, New York.

Mendelsohn, J., el Obeid S., de Klerk N. & Vigne P. 2006. Farming systems in Namibia. A publication for the Namibia National Farmers Union (NNFU). Published by RAISON (Research & Information Services of Namibia). ABC Press, South Africa. 80 p.

Mendelsohn, J. & el Obeid, S. 2005. Forests and woodlands of Namibia. Application for the Directorate of Forestry. Ministry of Agriculture, Water and Forestry. RAISON, Windhoek, Namibia. 152 p.

MHSS. 2008. Report on the 2008 National HIV Sentinel Survey. HIV Prevalence rate in Pregnant woman, biannual survey 1992–2008, Namibia. Ministry of Health and Social Services. 40 p.

MET. 2006. Namibia: Land Management Practice and Environmental Sustainability. Research Discussion paper no 76. Ministry of Environment and Tourism, Directorate of Environmental Affairs. Namibia. 112 p.

Mmopelwa, G. 2006. Economic and financial analysis of harvesting and utilization of river reed in Okavango Delta, Botswana. Journal of environmental management, 2006. Vol 79 (4) pp. 329–335. Harry Opperheimer Okavango Research Centre, University of Botswana.

Molnar, A., Scherr, S. & Khare, A. 2004. Who conserves the world's forests? Community-driven strategies to protect forests and respect rights. Forest Trends and Ecoagricultural Partners. Washington, DC.

Mongabay. 2010. Deforestation rates, tables and charts. Namibia. http://rainforest.mongabay.com/deforestation/Namibia

Mulofwa, J. 2010. Personal communication.

Mulofwa, J., Pfaff, B., Mitembe, W., Amadhila, E. & Otsub, M. 2003. Participatory Integrated Forest Management Plan for Okongo Community Forest. Final Document. Republic of Namibia. Ministry of Environment and Tourism, Directorate of Forestry. April 2004. 50 p.

Niskanen, A. 1998. Cost–benefit analysis of reforestation in Thailand and the Philippines. D.Sc. (Agr. & For.) thesis summary. Research Notes 71. University of Joensuu, Faculty of Forestry. Joensuun Yliopistopaino, Joensuu. 52 p.

Nkonya, E., Pender, J. & Kato, E. 2008. Who knows, who cares? The determinants of enactment, awareness, and compliance with community Natural Resource Management regulations in Uganda.

NPC. 2008a. The Third National Development Plan (NDP3) 2007/2008 to 2011/12. Volume Part I: Review of Implementation of the Second National Development Plan (NDP2): 2001/02–2005/06. 301 p. Part II: Third National Development Plan (NDP3): 2007/2008–2011/12. Part III: NDP3 implementation and monitoring, reporting and evaluation arrangements. 163 p.

NPC. 2008b. A Review of Poverty and Inequality in Namibia. National Planning Commission. 99 p.

NPC. 2006. EnviroPRE. Participatory review and Evaluation of Namibia-Swedish Cooperation in the Environmental Sector. Digital collection of selected Sida-funded publications from 1990 to 2007, funded by Sida and supported by the National Planning Commission.

NPC. 2006a. Caprivi Regional Poverty Profile. Based on Village-Level Participatory Poverty Assessments in the Caprivi Region, Namibia in October/November 2004. Full Report. National Planning Commission, Government of the Republic of Namibia. 130 p.

NPC. 2006b. Caprivi Regional Poverty Profile. Based on Village-Level Participatory Poverty Assessments in the Caprivi Region, Namibia in October-November 2004. Summary Report. National Planning Commission, Government of the Republic of Namibia. 2006. 61 p.

NPC. 2005. Proceedings Caprivi Poverty Forum. Organised by Caprivi Regional Council with Support from NPCS. Mukusi River Lodge, Katima Mulilo, June 29–July 1 2005. Caprivi Regional Council/NPCS. June/July 2005. 44 p + 68 p.

NPC. 2004a. Poverty Monitoring Strategy. Republic of Namibia, National Planning Commission, Poverty Reduction and Equity Sub-division, NPCS. September 2004. 64 p.

NPC. 2004b. Regional Poverty Profile. Based on Village-level Participatory Poverty Assessments in Ohangwena Region, Namibia in October/November 2003. Summary Report. National Planning Commission, Government of the Republic of Namibia. 2004. 42 p.

NPC. 2004c. Regional Poverty Profile. Ohangwena. Based on Village-Level Participatory Poverty Assessments in Ohangwena Region, Namibia in October/November 2003. Full Report. National Planning Commission. Windhoek, Namibia. 157 p.

NPC. 2003. 2001 Population and Housing Census. National Report. Basic Analysis with Highlights. July 2003. National Planning Commission. Central Bureau of Statistics. Windhoek, Namibia. 94+131 p.

NPC. 2002. Namibia, Initial National Communication to the United Nations Framework Convention on Climate Change. National Planning Commission. July 2002. 79+53 p.

Nygren, A. 2005. Community-based forest management with the context of institutional decentralization in Honduras. World Development 33 (4): 639–655.

Odendaal, P.B., Owen, D.L., Bosman, D.L., Schönau, K., Von Gadow, K. & Van der Zel. 1983. South African forestry handbook. Gutenberg Book Printers. RSA.

Oksanen T., Pajari, B. & Tuomasjukka, T. 2003. Forests in Poverty Reduction Strategies; Capturing the Potential. EFI Proceedings No 47. Tuusula, Finland 1–4 October, 2002. European Forest Institute. Gummerus Printing, Saarijärvi, Finland. 208 p.

Otsub M. & Omoro L.M.A. 2004. Integrated Forest Management Plan for Kwandu Community Forest. Ministry of Environment and Tourism, Directorate of Forestry, 25 p.

Pagiola, S. & Bosquet, B., 2009. Estimating the costs of REDD at the country level. Munich Personal RePEc Archive. Forest Carbon Partnership Facility, World Bank. MPRA Paper No. 13726. http://mpra.ub.uni-muenchen.de/13726.

Pandit, B.H. & Chetan, K. 2010. Factors influencing the integration of non-timber forest products into field cultivation: A case study from eastern Nepal. Journal of Sustainable Forestry. Sep–Dec 2011 Vol. 29 Issue 6–8 pp. 671–695.

Paramasevam, G., Hassan, M.N. & Mohamed, N. 2001. Environmentally conscious design and inverse manufacturing. Proceedings ECO Design 2001: Second international symposium pp. 766–768.

Paumgarter, F. & Shackleton, C.M. 2009. Wealth differentiation in household use and trade in non-timber production in South Africa. Ecological Economics, Oct 2009, Vol 68 Issue 12, pp. 2950–2959.

Pearce, D. 1983. Cost–benefit analysis. St. Martin's Press. New York.

Pearce, D., Barbier, E. & Markandya, A. 1990. Sustainable Development. Economics and Environment in the Third World. Edward Elgar. 217 p.

Peacre, D. W. & Turner, R. K. 1990. Economics of Natural Resources and Environment. The Johns Hopkins University Press. Baltimore. 378 p.

Peskett, L., Huberman, D., Bowen-Jones, E., Edwards, G. & Brown, J. 2008. Making REDD work for the poor. A poverty Environment Partnership (PEP) Report. 78 p.

Peskett, L., Brown, D. & Luttrell, C. 2006. Can payments for avoided deforestation to tackle climate change also benefit the poor? Overseas Development Institute (odi). Forestry Briefing 12. November 2006. Forest Policy and Environment Program. 6 p.

Pyatt, G. & Round, J. 1979. Accounting and Fixed Price Multipliers in Social Accounting. Economic Journal 89:850–873.

Ravallion, M. 2010. Mashup Indices of Development. Policy Research Working Paper 5422. The World Bank. Washington DC.

Ravallion, M. 2007. Economic growth and poverty reduction. Do poor countries need to worry about inequality. October 2007. 2020 Focus brief on the world's poor and hungry people. The World Bank. Washington, DC.

Ravallion, M. 2005. Inequality is Bad for the Poor. June 23, 2005. TheWorld Bank. Washington, DC.

Ravallion, M. 2004.Pro-poor Growth: A primer. The World Bank. Washington, DC.

Ravallion, M. 1998. Poverty line in theory and practice. LSM5. Living Standards, Measurement study. Working paper 0133. The World Bank, Washington, DC.

Ravallion, M. 1995. Growth, Inequality and Poverty. Looking Beyond Averages. Policy Research Working Paper 2558. The World Bank. Washington, DC.

Ravallion, M. & Chen, S. 2007. Absolute poverty measures for the developing world, 1981–2004. Policy Research working Paper Series 4211. The World Bank. Washington, DC.

Ravallion, M. & Chen, S. 2004. The Gini index is a measure of income ineqality within a population. The World Bank. Washington, DC.

Ravallion, M. & Chen, S. 2003. Measuring Pro-poor growth. Economic letters 78, pp. 93–99. Development Research Group. The World Bank. Washington, DC.

Ribot, J., Agrawal, A. & Larson, A. 2006. Recentralizing while decentralizing: how national governments reappropriate forest resources. World Development 34 (11): 1864–1886.

Sandbrook, C., Nelson, F., Adams, W.M. & Agrawal, A. 2010. Carbon, forests and the REDD paradox. Fauna & Flora International, Oryx 44 (3), pp. 330–334.

Sen, A. 1992. Poverty and Famines. An Essay on Entitlement and Deprivation. Oxford University Press. 257 p.

Seo, N., Mendelsohn, R., Dinar, A., Hassan, R. & Kurukulasuriya, P. 2009. A Ricardian Analysis of the Distribution of Climate Change Impacts on Agriculture across Agro-Ecological Zones in Africa. Environ Resource Econ. (2009) 43:313–332.

SIAPAC. 2007a. Final Inception Report, Socio-Economic Household survey In the Emerging Okongo Conservancy. Prepared by Social Impact Assessment and Policy Analysis Corporation (Pty) Ltd. (SIAPAC) for the Ministry of Environment and Tourism. 29 October 2007. 11 p.

SIAPAC. 2007b. Fieldwork Report, Socio-Economic Household Survey In the Okongo Community Forest and Emerging Okongo Conservancy. Prepared by Social Impact Assessment and Policy Corporation (Pty) Ltd. (SIAPAC) for the Ministry of Environment and Tourism and Directorate of Forestry (MAWF). 15 November 2007. 5 p.

Stern, N. 2007. The Economic of Climate Change. The Stern Review. Cambridge. 692 p.

Suszman, J. 2001. An Assessment of the Status of the San in Namibia. Regional Assessment of the Status of the San in Southern Africa. Report No. 4 and 5. Legal Assistance Centre. Windhoek, Namibia. 96 p.

Sydney, C. J. & Phillip, R.E. 2000. Economic & Business Principles In Farm Planning & Production. Iowa State University Press/Ames. 413 p.

Taylor, A.M. & Taylor, M.P. 2004. Purchasing Poverty Parity Debate. NBER Working Paper No 10607. www.nber.org/papers/w10607

Teweldmehidin, M. & Conroy, A.B. 2010. The economic importance of draught oxen on small farms in Nambia's Eastern Caprivi Region. African Journal of Agricultural Research Vol. 5 (9), pp. 928–934. 4 May 2010. http//www.academicjournals.org/AJAR

Turpie, J., Smith, B., Emerton, L. & Barnes, J. 1999. Economic value of the Zambezi Basin Wetlands. Economic value of the Zambezi Basin Wetlands. December 1999. IUCN Regional Office for Southern Africa. Zambezi Basin Wetlands Conservation and resources utilization project. The World Conservation Union. H.J. Ruitenbeek Resource Consulting Limited. 332 p.

UN. 2011. www.un.org

UNAM. 2008. Research in Farming Systems Change to Enable Adaption to Climate Change. Undertaken for the Ministry of Environment and Tourism and the United NationsDevelopment Program Namibia, in preparation of Namibia's Second National Communication to the United Nations Framework convention on Climate Change. University of Namibia. Windhoek, Namibia. 108 p.

UN. 2010. Population growth rate of Namibia in 2005–2010. Population Division of the Department of Economics and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision. http:esa.un.org/undp/unpp/index.htm

UNDP. 2007. Trends in Human Development and Human Poverty in Namibia. Background Paper to the Namibia Human Development Report, October 2007. 32 p. (www.undp.un.na/poverty/home.htm).

The World Bank. 2010. Development and Climate Change. World Development Report. Washington DC. 417 p.

World Bank. 2009. World Development Indicators database. October 2009.

World Bank 2008. Capacity building. The World Bank Carbon Finance Unit, Washington, DC.

World Bank. 2005. OVC Toolkit (Orphans and Vulnerable Children). http://info.worldbank.org/etools/docs/library/162495/other/copy.htm

World Bank. 2001. World Development Report 2000/2001: Attacking Poverty. Oxford University Press. Oxford.

WTTC. 2006. Namibia. The Impact of Travel & Tourism on Jobs and the Economy. World Travel & Tourism Council. 60 p.

Wunder, S. 2008. How do we deal with leakage? In: Angelsen, A. (ed.). Moving ahead with REDD: issues, options and implications, pp. 65–75, CIFOR, Bogor, Indonesia.

ANNEXES

ANNEX 1 Earlier projects in Okongo and Kwandu

OKONGO Project: Sustainable Management of Indigenous Forests

Benefits Namibian dollars, N$

Investments; projects	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Grants	447 207	421 893	398 014	3 430 425	817 138	770 885	727 250	686 085	61 000	0	0	7 759 897
Total	447 207	421 893	398 014	3 430 425	817 138	770 885	727 250	686 085	61 000	0	0	7 759 897

Economic benefits of earlier project investments (buildings and tools) in the community

Depreciation value	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Vehicles				297 152	283 483	251 985	247 739	225 089	198828	125992	134 042
Equipments			17 265	13 726	9 699	5 141	0				
Equipments				47 110	37 452	26 466	14 027	0			
Equipments					2 019	1 605	1 134	601	0		
Equipments						509	405	286	152	0	
Equipments								516	410	290	154
Buildings					26 944	27 847	28 761	29 684	30 615	31 550	32 487
Buildings									61 000	63 044	65 113
									291 005		231 796
Total (GRN+Donor)									320 106		254 976

The depreciation value of investments was N$291 005 in 2006, used in amortiation 40 years for buildings and

4 years for equipments (mainly hand tools), and 10 years for vehicles. In addition the government's investment was 20 %.

Projects: Conservancy; Life II, Forestry; Namibia-Finland Forestry Programme

KWANDU Namibian dollars, N$

Benefits	Life	Life	Life	Life, NFFP	Life, NFFP	Life, NFFP	Life, NFFP	Life, NFFP				
Investments; projects	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
GRANT-Life	9 563	18 044	116 141	118 307	104 147	103 674	33 732	17 055	0	0	0	520 663
NFFP Phase II Project	0	0	0	663 884	626 305	590 854	557 410	525 858	0	0	0	2 964 311
Total	9 563	18 044	116 141	782 191	730 452	694 529	591 141	542 914	0	0	0	3 484 975
Capital investments	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**total**
Life Project investments	0	0	0	133 823	0	416 856	44 944	848	0	0	0	596 470
NFFP Project investments	0	0	0	5 742	5 417	5 110	4 821	4 548	0	0	0	25 638
Total	0	0	0	139 564	5 417	421 966	49 765	5 396	0	0	0	622 108
TOTAL	9 563	18 044	116 141	921 755	735 869	1 116 494	640 906	548 310	0	0	0	4 107 082

Economic benefits of earlier project investments (buildings and tools) in the community

Depreciation value	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Life Invest. I 2001				100 000	103 350	106 742	110 169	113 623	117 095	120 574	124 049
Life Invest. II 2003						350 000	361 725	373 597	385 591	397 680	409 832
Life Invest. III 2004							40 000	41 340	42 697	44 068	45 449
Life Invest. IV 2005								800	636	449	238
NFFP Invest. 2001				4 291	3 411	2 411	1 278	0			
NFFP Invest. 2002					4 291	3 411	2 411	1 278	0		
NFFP Invest. 2003						4 291	3 411	2 411	1 278	0	
NFFP Invest. 2004							4 291	3 411	2 411	1 278	0
NFFP Invest. 2005								4 291	3 411	2 411	1 278
									553 119		580 846
Total (GRN+donor)									608 431		638 931

The depreciation value of investments was N$553 119 in 2006,

used in amortiation 40 years for buildings and 4 years for equipments (mainly hand tools).

ANNEX 2 **Benefits and costs**

Home consumption and labour of agriculture, forestry and

OKONGO 2003-2008 **community group activities included** Namibian dollars, N$

Benefits	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Forestry Project income	28 811	24 896	11	8 009	0	0	61 726
Cuinea fowls, community	0	0	2 170	223	513	44	2 951
Hammer mill, community	0	0	1 688	484	0	0	2 172
Carpentry, community	0	0	0	0	1 085	31 310	32 395
Agriculture, home cons. + sale	3 455 368	3 272 873	3 100 016	2 936 288	2 781 163	2 634 234	18 179 942
Forestry, community	0	0	12 336	27 887	113 918	13 956	168 097
Forestry, home cons. + sale	1 158 732	1 097 534	1 039 567	981 116	929 283	880 189	6 086 421
Community group activities	15 434	14 619	13 847	13 115	12 422	11 766	81 203
Camping, community	0	0	6 420	6 510	4 226	10 671	27 828
Trophy hunting, community	0	0	0	0	0	0	0
Hunting, home cons.	0	0	0	0	0	0	0
Rent, community	0	0	199	679	559	0	1 438
Other, community	0	0	1 799	1 000	681	1 253	4 733
Interest, community	0	0	0	0	0	0	0
Total	4 658 346	4 409 921	4 178 053	3 975 311	3 843 851	3 583 423	24 648 904

Costs	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Other project activities	17 707	22 229	5 233	23 773	50 592	36 479	156 012
Cuinea fowls, community	0	0	619	160	472	178	1 429
Hammer mill, community	0	0	1 283	1 924	0	0	3 207
Carpentry, community	0	0	74	0	3 295	14 899	18 268
Agriculture, home cons. + sale	5 093 217	4 824 218	4 569 427	4 328 092	4 099 438	3 882 864	26 797 255
Forestry, community	0	0	4 627	5 567	8 401	9 584	28 179
Forestry, home cons. + sale	422 390	400 081	378 951	358 937	339 975	322 013	2 222 347
Community group activities	11 805	11 182	10 592	10 032	9 502	9 000	62 112
Camping, community	0	0	3 358	1 959	8 013	3 272	16 602
Trophy hunting, community	0	0	0	0	0	0	0
Hunting, home cons.	0	0	0	0	0	0	0
FMC, community	0	0	8 384	8 362	21 474	17 198	55 417
Car, transport, community	0	0	2 355	7 654	28 612	21 038	59 659
Other, community	0	0	297	2 429	36	0	2 762
Total	5 545 119	5 257 710	4 985 199	4 748 889	4 459 808	4 316 525	29 423 250

ANNEX 3 **Benefits and costs**

Labour costs of agriculture, forestry and community group

OKONGO 2003-2008 **activities excluded** Namibian dollars, N$

Benefits	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Community trials, community	28 811	24 896	11	8 009	0	0	61 726
Cuinea fowls, community	0	0	2 170	223	513	44	2 951
Hammer mill, community	0	0	1 688	484	0	0	2 172
Carpentry, community	0	0	0	0	1 085	31 310	32 395
Agriculture, home cons. + sale	3 455 368	3 272 873	3 100 016	2 936 288	2 781 163	2 634 234	18 179 942
Forestry, community	0	0	12 336	27 887	113 918	13 956	168 097
Forestry, home cons.	1 158 732	1 097 534	1 039 567	981 116	929 283	880 189	6 086 421
Community group activities	15 434	14 619	13 847	13 115	12 422	11 766	81 203
Camp site, community	0	0	6 420	6 510	4 226	10 671	27 828
Trophy hunting, community	0	0	0	0	0	0	0
Hunting, home cons.	0	0	0	0	0	0	0
Rent, community	0	0	199	679	559	0	1 438
Other, community	0	0	1 799	1 000	681	1 253	4 733
Interest, community	0	0	0	0	0	0	0
Total	4 658 346	4 409 921	4 178 053	3 975 311	3 843 851	3 583 423	24 648 904

Costs	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Community trials , community	17 707	22 229	5 233	23 773	50 592	36 479	156 012
Cuinea fowls, community	0	0	619	160	472	178	1 429
Hammer mill, community	0	0	1 283	1 924	0	0	3 207
Carpentry, community	0	0	74	0	3 295	14 899	18 268
Agriculture, home cons. + sale	32 398	30 687	29 066	27 531	26 076	24 699	170 458
Forestry, community	0	0	4 627	5 567	8 401	54 766	73 361
Forestry, home cons. + sale	0	0	0	0	0	0	0
Community group activity	0	0	0	0	0	0	0
Camp site, community	0	0	3 358	1 959	8 013	3 272	16 602
Trophy hunting, community	0	0	0	0	0	0	0
Hunting, home cons.	0	0	0	0	0	0	0
FMC, community	0	0	8 384	8 362	21 474	17 198	55 417
Car, transport, community	0	0	2 355	7 654	28 612	21 038	59 659
Other, community	0	0	297	2 429	36	0	2 762
Total	50 105	52 915	55 296	79 359	146 971	172 528	557 174

ANNEX 4 **Benefits and costs**

OKONGO 2003-2008 **Home consumption of agriculture, forestry and community group activities excluded**

Benefits	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**total**
Community projects	28 811	24 896	11	8 009	0	0	61 726
Cuinea fowls, community	0	0	2 170	223	513	44	2 951
Hammer mill, community	0	0	1 688	484	0	0	2 172
Carpentry, community	0	0	0		1 085	31 310	32 395
Agriculture, sale	437 815	414 692	392 789	372 044	352 389	333 772	2 303 500
Forestry, community	0	0	12 336	27 887	113 918	13 956	168 097
Forestry, sale	17 196	16 288	15 427	14 612	13 840	13 109	90 471
Community groups activities	15 669	14 842	14 058	13 315	12 611	11 945	82 439
Camp site, community	0	0	6 420	6 510	4 226	10 671	27 828
Trophy hunting	0	0	0	0	0	0	0
Hunting, home cons.	0	0	0	0	0	0	0
Rent	0	0	199	679	559	0	1 438
Other	0	0	1 799	1 000	681	1 253	681
Interest	0	0	0	0	0	0	0
Total	499 491	470 716	446 897	444 763	499 823	416 060	2 777 750

Costs	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Community trials	17 707	22 229	5 233	23 773	50 592	36 479	156 012
Cuinea fowls, community	0	0	619	160	472	178	1 429
Hammer mill, community	0	0	1 283	1 924	0	0	3 207
Carpentry, community	0	0	74	0	3 295	14 899	18 268
Agriculture, sale	90 242	85 819	80 962	76 686	72 635	68 798	475 142
Forestry, community	0	0	4 627	5 567	8 401	9 584	28 179
Forestry, sale	7 381	6 991	6 622	6 272	5 941	5 627	38 833
Community group activities	11 805	11 182	10 592	10 032	9 502	9 000	62 112
Camp site, community	0	0	3 358	1 959	8 013	3 272	16 602
Trophy hunting	0	0	0	0	0	0	0
Hunting, home cons.	0	0	0	0	0	0	0
FMC	0	0	8 384	8 362	21 474	17 198	55 417
Car, transport	0	0	2 355	7 654	28 612	21 038	59 659
Other, community	0	0	297	2 429	36	0	2 762
Total	109 428	103 993	119 172	121 045	158 380	149 592	917 622

ANNEX 5 **Benefits and costs**

KWANDU 2003-2008 **Home consumption and labour costs of agriculture, forestry and community group activities included**

Namibian dollars, N$

Benefits	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Grants: HACSIS	0	51 635	0	15 700	16 774	4 272	88 381
Agriculture, sale+home cor	437 490	412 726	390 928	370 281	350 719	332 190	2 294 334
Forestry, community	0	0	0	7 712	434	12 582	20 728
Forestry, home cons. + sale	620 365	587 600	556 566	527 171	499 321	472 941	3 263 964
Community groups	12 853	12 174	11 532	10 923	10 346	9 800	67 628
Camp site, community	0	0	84 334	67 977	63 189	41 287	256 786
Trophy hunting	263 973	189 012	149 325	131 528	264 041	262 446	1 260 325
Hunting, home cons.	0	0	0	0	0	14 850	14 850
Other	0	0	0	12 507	0	107 939	120 446
Bank, Interest	0	10 680	571	292	451	1 048	13 043
Private loans; paid back	0	0	37 842	26 406	15 357	0	79 605
Total	1 334 681	1 263 828	1 119 256	1 144 091	1 205 274	1 259 355	7 480 088

Namibian dollars, N$

Costs	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Agriculture, home cons. + s	729 751	691 210	654 704	620 125	587 364	556 333	3 839 487
Forestry, community	132 063	124 588	117 536	110 883	104 607	118 246	707 923
Forestry, home cons. + sale	188 208	178 268	168 853	159 935	151 486	143 483	990 232
Community group activitie	12 401	11 746	11 126	10 538	9 981	9 454	65 245
Camp site, community	0	0	79 089	83 900	47 525	54 478	264 991
Trophy hunting, meat; com	125 160	118 076	111 392	105 087	99 139	161 677	720 531
Hunting, home consumptio	110	103	98	92	87	82	571
Other, community	0	0	0	5 000	4 717	4 450	14 167
Total	1 189 696	1 123 991	1 142 797	1 095 560	1 004 905	1 048 201	6 603 147

ANNEX 6 **Benefits and costs**

Labour costs of agriculture, forestry and community group

KWANDU 2003-2008 **activities excluded**

Namibian dollars, N$

Benefits	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Grants: HACSIS	0	51 635	0	15 700	16 774	4 272	88 381
Agriculture, home cons. + sale	435 490	412 726	390 928	370 281	350 719	332 190	2 294 334
Forestry, community	0	0	0	7 712	434	12 582	20 728
Forestry, home cons. + sale	620 365	587 600	556 566	527 171	499 321	472 941	3 263 964
Community group activities	12 853	12 174	11 532	10 923	10 346	9 800	67 628
Camp site, community	0	0	84 334	67 977	63 189	41 287	256 786
Trophy hunting, community	263 973	189 012	149 325	131 528	264 041	262 446	1 260 325
Hunting, home cons.	0	0	0	0	0	14 850	14 850
Other, community	0	0	0	12 507	0	107 939	120 446
Bank, Interest, community	0	10 680	571	292	451	1 048	13 043
Private loans paid back	0	0	37 842	26 406	15 357	0	0
Total	1 334 681	1 263 828	1 119 256	1 144 091	1 205 274	1 259 355	7 480 088

Namibian dollars, N$

Costs	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Agriculture, home cons. + sale	7 532	7 134	6 756	6 400	6 062	5 742	39 627
Forestry, community	132 063	124 588	117 536	110 883	104 607	118 246	707 923
Forestry, home cons. + sale	0	0	0	0	0	0	0
Community group activities	6 811	6 452	6 111	5 788	5 482	5 192	35 836
Camp site, community	0	0	79 089	83 900	47 525	54 478	264 991
Trophy hunting, community	125 160	118 076	111 392	105 087	99 139	161 677	720 531
Hunting, own use, no labour	110	103	98	92	87	82	571
Other, community	0	0	0	5 000	4 717	4 450	14 167
Total	271 677	256 353	320 982	317 150	267 618	349 867	1 783 646

ANNEX 7 **Benefits and costs**

Home consumption of agriculture, forestry and community group activities exluded

KWANDU 2003-2008

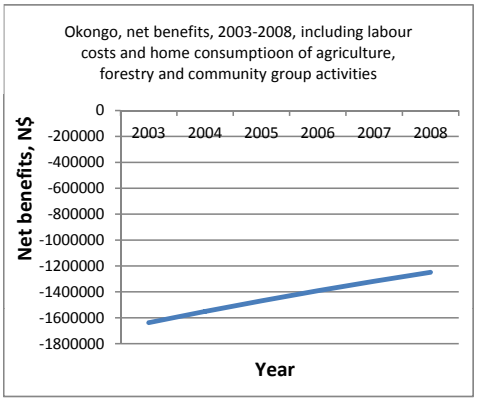
Namibian dollars, N$

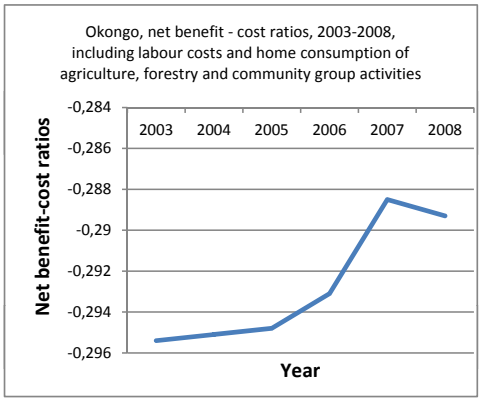
Benefits	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Grants: HACSIS	0	51 635	0	15 700	16 774	4 272	88 381
Agriculture, sale	109 865	104 062	98 566	93 360	88 427	83 756	578 037
Forestry, community	0	0	0	7 712	434	12 582	20 728
Forestry, sale	36 285	34 369	32 554	30 834	29 205	27 662	190 909
Community groups, hh	12 853	12 174	11 532	10 923	10 346	9 800	67 628
Camp site, community	0	0	84 334	67 977	63 189	41 287	256 786
Trophy hunting, Meat;	263 973	189 012	149 325	131 528	264 041	262 446	1 260 325
Hunting, home consum	0	0	0	0	0	14 850	14 850
Other	0	0	0	12 507	0	107 939	120 446
Bank, Interest	0	10 680	571	292	451	1 048	13 043
Private loans; commun	0	0	37 842	26 406	15 357	0	79 605
Total	422 977	401 932	376 882	370 833	472 866	565 641	2 690 736

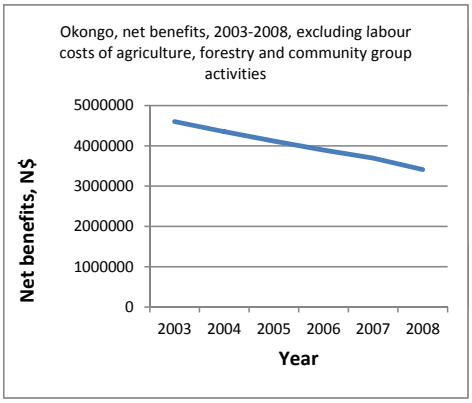
Namibian dollars, N$

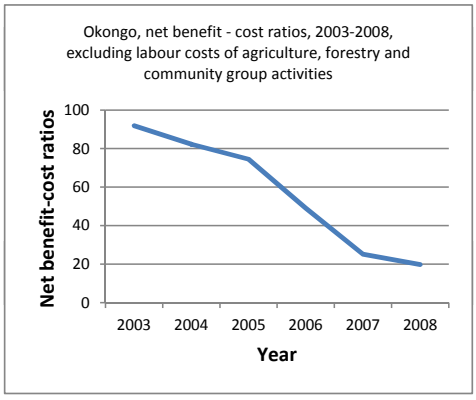
Costs	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
Agriculture, sale	119 152	112 859	106 898	101 252	95 903	90 837	626 900
Forestry, community	132 063	124 588	117 536	110 883	104 607	118 246	707 923
Forestry, sale	11 821	11 197	10 605	10 045	9 514	9 011	62 193
Community group activ	12 401	11 746	11 126	10 538	9 981	9 454	65 245
Camp site, community	0	0	79 089	83 900	47 525	54 478	264 991
Trophy hunting	125 160	118 076	111 392	105 087	99 139	161 677	720 531
Hunting, home cons.	110	103	98	92	87	82	571
Other, community	0	0	0	5 000	4 717	4 450	14 167
Total	400 707	378 569	436 743	426 797	371 472	448 233	2 462 521

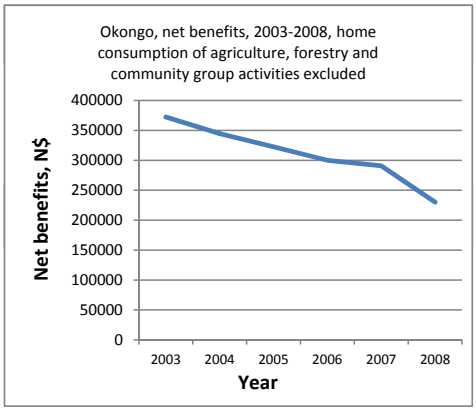
ANNEX 8 Okongo net benefits and net benefit - cost ratios, 2003-2008

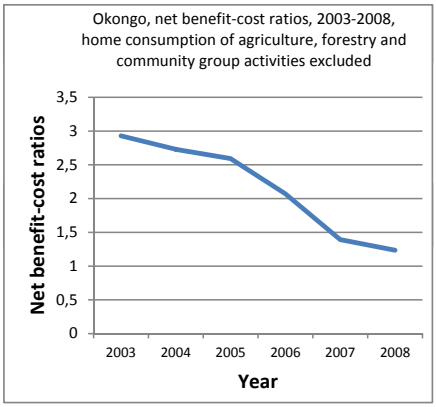




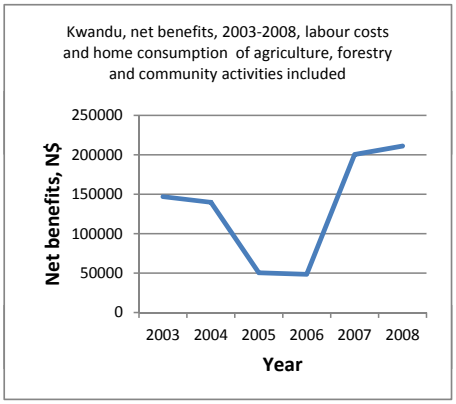


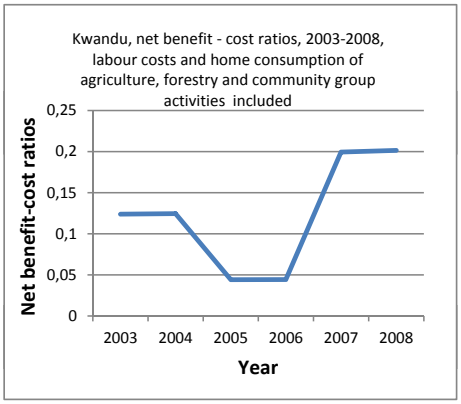


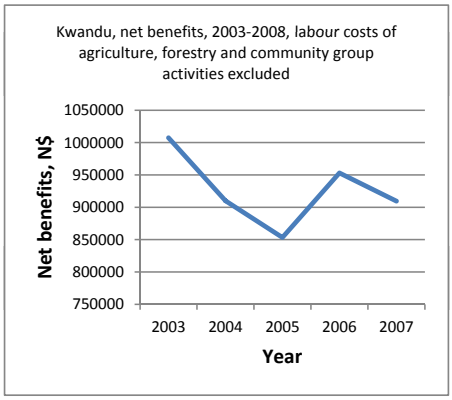


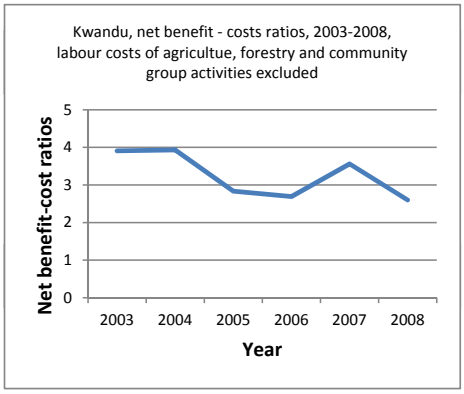


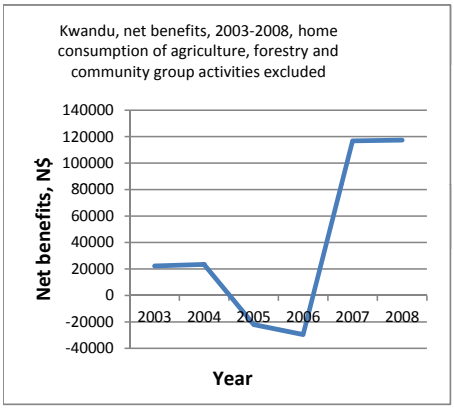
ANNEX 9 Kwandu net benefits and net benefit - cost ratios, 2003-2008

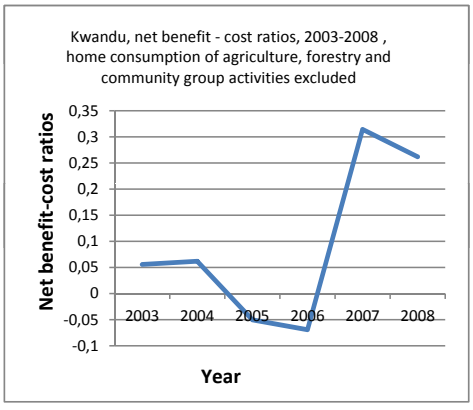












ANNEX 10 Agricultural prices and costs

OKONGO

Agriculture	Price, N$		Cost, N$	
bean	1	N$/kg	0,7	N$/kg
groundnut	4,5	N$/kg	0,7	N$/kg
onion	10	N$/kg	0,7	N$/kg
species	0	N$/kg	0	N$/kg
pumpkin	1	N$/kg	0,7	N$/kg
beetroot	0	N$/kg	0	N$/kg
un. veg	0	N$/kg	0	N$/kg
water melon	1	N$/kg	0,7	N$/kg
sweet melon	1	N$/kg	0,7	N$/kg
guava	0	N$/kg	0	N$/kg
maize	1,58	N$/kg	1 558	N$/ha
millet	2,1	N$/kg	1 432	N$/ha
sorghum	2,1	N$/kg	1 438	N$/ha
cattle	2 373	N$/animal	107	N$/animal
slaught. cow	1 238	N$/animal	107	N$/animal
calf	1 500	N$/animal	107	N$/animal
bull (cast.)	5 000	N$/animal	107	N$/animal
cow	2 723	N$/animal	107	N$/animal
heifer	3 000	N$/animal	107	N$/animal
oxen	2 378	N$/animal	107	N$/animal
goats	285	N$/animal	93	N$/animal
sheep	285	N$/animal	93	N$/animal
pig	500	N$/animal	93	N$/animal
poultry	25	N$/animal	11	N$/animal
donkey	1 062	N$/animal	107	N$/animal
horse	2 605	N$/animal	107	N$/animal

seeds
2.5 N$/kg
3.2 N$/kg

mortality rate; 10-20 %, calving rate; 50 %

Cattle	Composition of heard (60 animals)			
	%	N	N$ á	Total
cows	40	24	2 723	65 352
oxen	20	12	2 378	28 536
heifers	10	6	3 000	18 000
calves	30	17	1 500	25 500
bulls	1	1	5 000	5 000
average price		60	2 373	142 388

Goats	Composition of heard (20 animals)			
	%	N	N$, á	Total
male kids	11	2	250	500
female kids	9	2	250	500
un-neutered	14	3	280	840
neutered	9	2	280	560
female, less	12	2	400	800
goat ewes	30	6	400	2 400
goat, rams	15	3	700	2 100
average price		20	385	7 700

Donkeys	N$
small female	150
other	850
average	700

Poultry	N$
chicken	10
hen	45
cock	45
average	20

Pigs	N$
small	100
big	800
average	500

Average livestock size
per household
(household survey 105 households)

cows	60
oxen	6
goat	20
chicken	25

Costs

One ha	Manual	Draught anima	Tractor
hoeing	299	0	0
tilling	0	92	278
planting	184	184	184
weeding	621	621	621
harvesting	161	161	161
treshing	161	161	161
	1 426	1 219	1 405

Costs

Grazing 365 days á N$23

cattle	Total, yr, N$
1 person	8 365
2 persons	16 790
3 persons	25 185
4 persons	33 580

Calculated 2 persons grazing ½ year, total cost N$8 365

1-4 people/household working in grazing

Heard (average): 60 cattle + 6 oxen (80 per cent of grazing costs)
20 goats (20 per cent of grazing costs)

Cost per animal per yr	
oxen	107
goat	93

ANNEX 11 Forestry prices and costs

OKONGO

	Benefits		Costs						
Forestry	N$		N$		N	Average size	**Harvesting**		Cost
saw timber	120	N$/m3	15	N$/m3		0.125 each	Saw timber	Harvesting	N$15/tree
timber dry	0	N$/m3		N$/m3				Processing	N$50/tree
poles	100	N$/m3	33	N$/m3,	N$4/each	0.055 each		Transport	N$15
thin poles	120	N$/m3	40	N$/m3,	N$3/each	0.025 each		Processing	N$50
firewood	400	N$/m3	218	N$/m3	N$5/bundle		Poles	Harvesting	N$1/tree
craft wood	120	N$/m3	86	N$/m3					
green leaves	30	N$/kg	2,3	N$/kg					
roots	17	N$/kg	2,3	N$/kg					
edible ants	100	N$/kg	11,5	N$/kg					
wild fruit	11	N$/kg	1,15	N$/kg			Firewood	Harvesting	N$180/m3
wild honey	50	N$/kg	9,2	N$/kg				Transport, way	N$38/m3
mushroom	30	N$/kg	23	N$/kg				Marketing	N$15
palm leaves	377	N$/m3	46	N$/m3			Craft		N$86/m3
thatch grass	555	N$/m3	210	N$/m3	N$1,15/bundle				
med. bark	429	N$/kg	2,3	N$/kg					
med. leaves	1 000	N$/kg	2,3	N$/kg					
med. roots	333	N$/kg	4,6	N$/kg					
med. stem	0	N$/kg	0	N$/kg					
med. plant	0	N$/kg	0	N4/kg					

Non-wood fores	Green leave	Roots	Edible ants	Wild fruits	Wild hon	Mushroom
coll. per day, kg	10		2		5	1
price N$ per kg	30	17	100	11	50	30
cost N$ per kg	2,3	2,3	11,5	1,15	9,2	23

Medicinal plant	Barks	Roots	Leaves
coll. per day, kg	10	5	10
price N$ per kg	429	333	1 000
cost N$ per kg	2,3	4,6	2,3

Grass productio	Thatch	Palm leaves
price, N$/m3	555	377
price/bundle, N$		10
cost, N$/m3	210	
cost/bundle		1,15

ANNEX 12 **Agricultural prices and costs in 2006**

KWANDU	Prices		Costs	
Agriculture	N$		N$	
bean	2,25	N$/kg	0,6	N$/kg
groundnut	2	N$/kg	0,6	N$/kg
species	10	N$/kg	0,6	N$/kg
pumpkin	13	N$/kg	0,6	N$/kg
beetroot	1	N$/kg	0,6	N$/kg
un. veg	1	N$/kg	0,6	N$/kg
water melon	5,5	N$/kg	0,6	N$/kg
guava	3	N$/kg	0,6	N$/kg
maize	1,75	N$/ha	1 558	N$/ha
millet	1,9	N$/ha	1 432	N$/ha
sorghum	3,7	N$/ha	1 438	N$/ha
slauht. cattle	400	N$/animal	80	N$/animal
calf	550	N$/animal	80	N$/animal
bull	4 000	N$/animal	80	N$/animal
oxen	2 466	N$/animal	80	N$/animal
cow	1 077	N$/animal	80	N$/animal
heifer	850	N$/animal	80	N$/animal
cattle (average)	1 288	N$/animal	80	N$/animal
goats	283	N$/animal	47	N$/animal
poultry	20	N$/animal	11	N$/animal

Composition of heard

Cattle	%	Number	Price, N$	Total, N$
male calves	5	8	800	6400
female calves	8	10	800	8000
un-neutered	14	18	800	14400
neutrered	8	10	850	8500
females	11	14	850	11900
cows	39	52	1 200	62 400
bulls	3	4	4 000	16 000
oxen	11	14	2 850	39 900
Total number		130		167 500

(household survey)

average price 1 288 N$/animal

Composition of heard

Goats	%	Number	Price, N$	Total, N$
male kids	11	9	150	1 350
female kids	9	8	150	1 200
un-neutered	14	12	250	3 000
neutered	9	7	250	1 750
females	12	10	250	2 500
goat ewes	30	25	300	7 500
goat rams	15	13	500	6 500
Total		84		23 800

(household survey)

average price 283 N$/aninmal

Harvesting costs per hectare

One hectare	Manual	Draught anim	Tractor
hoeing	299	0	0
tilling	0	92	278
planting	184	184	184
weeding	621	621	621
harvesting	161	161	161
treshing	161	161	161
	1 426	1 219	1 405

Grazing cost of cattle	
1-4 people/household	
á N$23 per da	Total, yr
	N$
1 person	8 365
2 persons	16 790
3 persons	25 185
4 persons	33 580

Poultry	N$
chicken	10
hen	45
cock	45
average price N$20	

Kwandu

Average livestock size

per household

(household survey 82 households)

Animal	n
cows	2
oxen	1
goat	1
chicken	5

ANNEX 13 Forestry prices and costs 2006

KWANDU

Forestry	Price		Cost		N	Average size	Harvesting		per day	Cost
saw timber	208	N$/m3	16	N$/m3		0.12 m3 each	Saw timber	Harvesting	3 trees	
timber dry	120	N$/m3	16	N$/m3				Processing	2 logs	
poles	120	N$/m3	70	N$/m3	N$4 each	0.055 m3 each	Poles	Harvesting, c	50 poles	
thin poles	40	N$/m3	28	N$/m3	N$1 each	0.025 m3 each		Harvesting, s	10 poles	
firewood	220	N$/m3	217	N$/m3	N$5 bundle	0.011 bundle		Harvesting, a	27 poles	
craft wood	120	N$/m3	86	N$/m3	N$46 each			Felling	10 poles	
green leaves	6	N$/kg	2,3	N$/kg				Transport	20 poles	
roots	17	N$/kg	2,3	N$/kg			Firewood	Harvesting	30 bundles	
edible ants	20	N$/kg	11	N$/kg				Transport, w	4	N$12/day
wild fruit	20	N$/kg	1,2	N$/kg				Permit		15
wild honey	20	N$/kg	15	N$/kg			Craft			N$86 each
mushroom	25	N$/kg	23	N$/kg						
thatch grass	226	N$/m3	210	N$/m3	N$1.15 bundle					
palm leaves	200	N$/m3	73	N$/m3						
reeds	226	N$/m3	158	N$/m3						
med. bark	429	N$/kg	2,3	N$/kg						
med. leaves	1 000	N$/kg	2,3	N$/kg						
med. roots	333	N$/kg	2,3	N$/kg						
med. stem	20	N$/kg	4,6	N$/kg						
med. plant	23	N$/kg	23	N$/kg						

Timber	N$/tree	N$/dry tree	N$/plank	N$/log	Harvesting costs	
Khiat	200	120	30	300		N$/tree
Zambesi teak	300	40	20		cutting	8
False mopani	300				pruning	8
GRN price		80			transport	15
average price	267	80	25		processing	50

Non-wood forest prod	Green leaves	Roots	dible ant	Wild fruit	Wild honey	Mushroom
collection per day, kg	10 (2.5 bundles)	10	2	20	1	1
price N$ per kg	6	16.7 /7.4	20	10	20	25
price per each				1		
cost N$ per kg	2,3	0,35	11	1,15	2,3	23

Medicinal plants	Medicinal barks	Medicinal ro	dicinal lea	edicinal st	Whole plant	Devil's claw
collec. per day, kg	10	10	10	5	1	
price N$ per kg	429	333	1 000	20	23	16
price per bundle, N$	10					
cost N$ per kg	2,3	2,3	2,3	4,6	23	0,5

Grass production	Thatch	Palm leaves	Reeds
price, N$/m3	226	200	226
price/bundle, N$	11,3	5	20
cost, N$/m3	210	73	158
cost/bundle	10	1,15	8

ANNEX 14 Okongo household poverty, 2006

Household number	Household head sex	Household head age	Number persons in hh	Income source	Household assets	Okongo price Livestock	Common price livestock	Food exp category	Food exp category	Food exp per person in hh	Food category	Other Other exp	Other per pp	TOTAL exp	TOTAL exp per pp	Livestock Sale revenue
	var1	**var2**	**var3**	**var4**	**var5**	**var6**	**var7**	**var8**	**var9**	**var10**	**var11**	**var12**	**var13**	**var14**	**var15**	**var16**
1	2	30	3	1	32 070	79 763	104 352	4 720	3	1 573	3	21 188	7 063	25 908	8 636	0
4	2	49	8	2	51 240	55 306	72 144	110 960	3	13 870	3	12 456	1 557	123 416	15 427	0
15	1	55	10	3	7 140	77 390	101 280	1 570	2	157	1	4 500	450	6 070	607	0
25	1	41	4	2	4 500	4 746	6 144	40	1	10	1	168	42	208	52	0
28	1	35	3	2	8 550	246 899	320 064	5 560	3	1 853	3	2 124	708	7 684	2 561	0
31	1	69	15	4	30 680	58 970	74 702	14 082	3	939	3	2 124	142	16 206	1 081	6 000
46	1	75	15	3	86 350	213 663	277 048	19 110	3	528	3	2 160	144	5 040	672	0
92	1	39	2	1	13 210	114 154	147 656	1 272	2	636	3	660	330	1 932	966	2 000
94	1	30	3	4	6 170	49 833	64 512	4 240	3	1 413	3	5 604	1 868	9 844	3 281	0
97	1	32	3	2	14 190	353 577	457 728	6 134	3	2 045	3	4 008	1 336	10 142	3 381	0
100	1	38	4	3	100	0	0	0	1	0	1	24	6	24	6	0
104	1	67	2	4	7 762	67 945	86 468	2 200	3	1 100	3	1 632	408	3 832	1 508	0
106	1	75	10	4	53 755	293 119	260 654	21 164	3	2 116	3	38 624	3 862	59 788	5 978	0
116	1	70	1	4	4 640	23 781	30 012	2 350	3	2 350	3	1 680	1 680	4 030	4 030	0
117	1	19	1	1	9 175	122 180	161 372	2 740	3	2 740	3	10 008	10 008	12 748	12 748	0
118	1	39	1	5	120	0	0	772	1	772	3	860	860	1632	1 632	0
119	1	67	7	4	24 860	92 062	232 728	20 265	3	2 895	3	26 724	3 818	46 989	6 713	2 450
126	1	87	7	4	16 260	178 565	230 642	6 320	3	903	3	2 520	360	8 840	1 263	0
133	1	24	2	1	13 650	64 623	82 088	688	1	344	3	1 140	570	1 828	914	0
135	1	35	3	1	5 620	0	0	3 038	3	1 013	3	3 876	1 292	6 914	2 305	0
138	1	46	6	1	7 490	46 518	58 926	4 332	3	722	3	2 208	368	6 540	1 090	0
144	1	48	2	3	15 195	71 340	92 280	1 022	1	511	3	1 128	564	2 150	1 075	0
146	1	38	6	1	143	0	0	50	1	8	1	520	87	570	95	0
152	1	60	4	1	70	0	0	24	1	6	1	12	3	36	9	0
156	1	21	1	1	1 110	1 710	2 616	1 901	3	1 901	3	3 108	3 108	5 009	5 009	0
157	1	37	2	5	1 220	1 737	1 602	3 333	3	1 667	3	2 520	12 690	5 853	2 927	0
159	1	37	5	2	1 910	3 186	3 186	3 050	3	610	3	1 080	216	4 130	826	0
166	1	43	3	3	87 815	975 880	685 356	76 624	3	25 541	3	6 360	2 120	82 984	27 661	32 200
169	1	58	3	3	21 270	511 904	1 263 960	3 322	3	1 107	3	2 412	804	5 734	1 911	8 150
172	1	65	6	4	39 090	80 326	104 266	7 260	3	1 210	3	5 928	988	13 188	2 198	0
178	2	75	4	4	1 370	1 562	1 462	1 178	1	295	3	1 332	333	2 510	628	0
182	1	47	9	2	26 420	34 022	42 724	3 268	3	363	3	7 056	784	10 324	1 147	115
191	1	86	15	4	2 200	67 118	86 380	18 730	3	1 249	3	5 916	394	24 646	1 643	0
206	1	48	9	5	33 220	60 320	76 294	9 240	3	1 027	3	5 436	604	14 676	1 631	0
215	1	54	2	2	9 650	208 103	250 020	2 630	3	1 315	3	1 440	720	4 070	2 035	40
217	1	46	2	5	7 240	88 395	117 988	2 970	3	1 485	3	1 416	708	4 386	2 193	0
219	1	63	16	4	26 190	81 689	103 952	2 975	3	186	2	1 632	102	4 607	288	1 700
235	1	40	4	2	11 750	30 583	38 716	7 780	3	1 945	3	14 760	3 690	22 540	5 635	0
239	1	24	1	5	33 630	88 118	112 752	844	1	844	3	504	504	1 348	1 348	0
240	1	52	2	2	11 600	48 030	6 312	5 520	3	2 760	3	2 796	1 398	8 316	4158	0
242	1	70	7	4	36 100	52 569	63 628	6 411	3	916	3	1 728	247	8 139	1 163	0
249	1	38	2	1	790	49 420	66 500	4 488	3	2 244	3	1 716	858	6 204	3 102	0
251	1	59	5	2	2 710	23 192	30 364	5 128	3	1 026	3	1 020	204	6 148	1 230	0
256	1	71	22	4	56 540	198 614	257 364	41 860	3	1 903	3	14 348	652	56 208	2 555	5 720
278	2	61	5	4	295	375	300	5 272	3	1 054	3	4 044	809	9 316	1 863	0
283	2	51	4	1	128	275	220	1 596	2	399	3	1 224	306	2 820	705	40
287	1	20	2	2	15 900	35 595	46 080	4 002	3	2 001	3	2 352	1 176	6 354	3 177	0
289	1	68	4	4	19 880	202 518	261 234	1 906	3	477	3	744	186	2 650	663	0
293	1	69	4	4	13 825	71 892	91 424	4 600	3	1 150	3	3 384	1 128	7 984	2 278	0
297	1	20	2	1	13 670	177 039	228 690	8 140	3	4 070	3	1 580	790	9 720	4 860	1 500
299	1	50	12	2	63 360	85 895	111 953	23 144	3	1 929	3	4 668	389	27 812	2 318	0
311	2	46	10	3	10 350	67 769	88 056	8 612	3	861	3	18 260	1 826	26 872	2 687	180
321	2	65	9	4	3 570	15 321	18 216	4 350	3	483	3	7 092	788	11 442	1 271	0
330	1	41	4	2	33 920	126 995	165 048	8 316	3	2 079	3	3 660	915	11 976	14 055	3 400

334	2	68	5	4	31 920	186 709	240 034	7 446	3	1 489	3	4 080	816	11 526	2 305	0
339	1	56	10	3	314 100	188 286	246 290	30 400	3	3 040	3	4 764	476	35 164	3 516	0
349	1	31	4	2	28 350	118 275	154 260	14 266	3	3 567	3	8 460	2 115	22 726	5 682	0
353	1	45	6	2	18 030	3 336	3 306	8 611	3	1 435	3	2 584	431	11 195	1 866	0
359	1	38	4	2	715	375	300	4 136	3	1 034	3	1 488	372	5 624	1 406	0
363	2	63	3	4	35 010	133 335	170 340	14 716	3	4 905	3	8 640	2 880	23 356	7 785	2000
366	1	57	7	1	53 883	76 059	96 630	3 932	3	562	3	1 908	273	5 840	835	0
373	1	50	3	2	24 165	249 604	323 904	7 960	3	2 653	3	8 960	2 987	16 920	5 640	30 920
376	2	36	3	2	600	0	0	16 878	3	5 626	3	11 016	3 672	27 894	9 298	0
379	1	55	1	1	210 840	453 494	586 204	18 499	3	18 499	3	10 156	10 156	28 655	28 655	15
380	2	50	12	2	8 647	11 680	15 444	18 650	3	1 554	3	5 088	424	23 738	1 978	0
392	1	38	6	2	4 670	24 055	30 980	1 855	3	309	3	1 680	280	3 535	589	0
398	1	52	2	2	52 605	105 567	135 792	9 670	3	4 835	3	4 044	404	13 714	5 239	0
400	1	54	2	3	61 280	68 636	88 178	10 630	3	5 315	3	2 544	1 272	13 174	6 587	3 000
402	1	62	8	4	151 860	384 248	500 928	81 065	3	10 133	3	9 268	1 159	90 333	11 292	0
410	1	62	5	4	54 710	89 843	117 036	7 687	3	1 537	3	9 460	1 892	17 147	3 429	0
415	1	25	4	5	404 670	461 893	597 134	96 540	3	24 135	3	4 620	1 155	101 160	25 290	4 000
419	1	40	5	2	141 104	664 835	867 300	24 094	3	4 819	3	5 804	1 161	29 898	5 980	5 750
424	1	27	1	2	33 840	313 913	404 548	3 182	3	3 182	3	7 956	7 956	11 138	11 138	1 730
425	1	39	4	3	8 790	95 880	127 140	1 400	2	350	3	600	150	2 000	500	0
429	1	70	4	4	3 580	43 615	120	2340	3	585	3	924	92	3 264	677	0
433	1	45	2	2	580	150	120	2 720	3	1 360	3	2 448	1 224	5 168	2 584	0
435	1	43	3	1	22 510	95 036	122 548	3 488	3	1 163	3	912	304	4 400	1 467	0
438	1	68	4	4	16 600	603 508	778 118	2 840	3	710	3	2 076	519	4 916	1 229	0
442	1	65	2	4	3 720	62 885	81 034	2 830	3	1 415	3	852	426	3 682	1 841	0
444	1	46	10	2	95 920	180 926	234 092	42 854	3	4 285	3	2 992	299	45 846	4 584	0
454	1	29	2	2	840	42 640	54 488	3 140	3	1 570	3	996	498	4 136	2 068	30
456	1	62	3	3	94 910	879 532	1 141 054	16 500	3	5 500	3	1 044	348	17 544	5 848	37 000
459	1	42	3	3	8 600	209 949	125 146	1 680	2	560	3	1 980	660	3 660	1 220	0
462	1	46	6	2	217 200	96 438	396 390	28 790	3	4 798	3	15 936	2 656	44 726	7 475	1 500
468	1	67	4	4	115 950	310 533	396 390	4 806	3	1 202	3	1 512	378	6 318	1 580	5 090
472	1	63	12	4	17 800	102 888	133 942	17 220	3	1 435	3	29 808	2 484	47 028	3 919	0
484	1	22	3	1	28 715	183 669	237 876	1 688	3	563	3	924	308	2 612	871	0
487	2	27	1	2	3 700	0	0	16 264	3	16 264	3	5 016	5 016	21 280	21 280	0
488	2	26	1	2	1 890	875	700	2 804	3	2 804	3	2 304	2 304	5 108	5 108	0
489	1	66	3	4	505	0	2 637 590	1 300	2	433	3	960	320	2 260	753	0
492	1	34	3	5	22 420	2 038 727	0	36 930	3	12 310	3	4 920	1 640	41 850	13 950	0
495	2	25	1	2	0	0	0	646	1	646	3	2 604	2 604	3 250	3 250	0
496	1	25	3	2	11 090	455 724	588 384	36 750	3	12 250	3	9 624	3 208	46 374	15 458	2 070
499	1	37	5	1	870	3 702	1 446	4 192	3	838	3	4 464	893	8 656	1 731	0
504	1	67	5	4	5 520	43 514	55 936	5 985	3	1 197	3	5 000	1 000	10 985	2 197	0
509	1	29	2	2	67 185	111 329	142 668	4 170	3	2 085	3	1 560	780	5 730	2 865	0
61	1	20	2	1	26 680	298 434	387 884	2 640	3	1 320	3	264	132	2 904	1 452	0
63	1	63	5	4	39 840	215 990	285 400	2 580	3	516	3	1 176	235	3 756	4 272	0
68	1	29	1	1	5 636	42 689	53 774	1 260	2	1 260	3	420	420	1 680	1 680	0
69	1	52	1	2	4 370	94 450	122 968	3 610	3	3 610	3	2 100	2 100	5 710	9 320	0
73	1	67	2	4	6 290	75 939	98 304	5 593	3	2 797	3	636	318	6 229	3 115	0
75	1	37	5	2	6 165	192 611	247 684	4 968	3	994	3	1 260	252	6 228	1 246	20
80	1	35	3	3	33 300	104 588	134 560	15 250	3	5 083	3	1 320	440	16 570	5 523	0
83	1	73	3	4	16 280	261 838	341 176	12 750	3	4 250	3	5 844	1 948	18 594	6 198	0
86	1	57	6	2	8 765	142 657	183 044	3444	3	574	3	2 628	438	6 072	1 012	0

gifts =1

salary = 2

business = 3

pension = 4

none = 5

Okongo annual food expenditure, N$

1 = ≤ 1 180 severly poor

2 = 1 181-1 680 poor

3 = ≥ 1 681 well-off

Okongo annual food expenditure per person, N$

1 ≤ 184.55 serverely poor

2 184.56-262.45 poor

3 ≥ 262.46 well-off

male = 1

female = 2

ANNEX 15 **Kwandu household poverty, 2006**

Household number	Household head sex	Household head age	Number persons in hh	Household income source	Household assets	Kwandu price livestock	Common price livestock	Food exp	Food exp category	Food exp per person	Food category	Other exp Other exp	Other per pp	TOTAL exp	TOTAL exp per pp	Livestock Sale revenue
var	**var1**	**var2**	**var3**	**var4**	**var5**	**var6**	**var7**	**var8**	**var9**	**var10**	**var11**	**var12**	**var13**	**var14**	**var15**	**var16**
98	2	69	6	5	15	4 264	9 616	3 426	3	571	3	2 239	373	5 665	944	70
93	2	53	3	1	140	0	0	520	1	173	2	635	212	1 155	385	0
88	1	24	4	2	3 500	1 288	3 072	5526	3	1382	3	2415	604	7 941	1986	0
96	2	64	6	5	40	100	0	1192	2	199	2	3400	567	4592	766	0
84	1	32	5	1	2 470	60	60	572	1	114	1	2 120	424	2 692	538	0
86	1	74	12	5	490	60	60	6 740	3	562	3	9 770	814	16 510	1 376	0
83	1	35	8	2	3 605	1 408	3 192	3 744	3	468	3	24 392	3 049	28 136	3 517	0
97	1	39	6	3	1 910	2 576	6 144	598	1	100	1	458	76	1 056	176	0
82	1	42	11	1	22 900	13 944	28 880	45 962	3	4 178	3	54 907	4 992	100 869	9 170	0
95	1	67	7	5	1 450	2 696	6 264	6 520	3	931	3	5 784	826	12 304	1 757	0
92	2	23	2	1	0	0	0	260	1	130	1	392	196	652	326	0
45	2	36	7		12	0	0	8 624	3	1 232	3	12 840	1 834	21 464	3 066	0
91	2	70	7	5	15	0	0	4 558	3	651	3	1 336	191	5 894	842	0
89	1	43	3	1	100	1 288	3 072	1 196	2	399	3	185	62	1 381	461	0
87	1	50	7	2	1 015	1 152	1 764	4 026	3	575	3	15 441	2 206	19 467	2 781	0
90	1	63	8	5	1 265	160	160	13 752	3	1 719	3	13 850	1 731	27 602	3 450	0
10	1	59	7	2	0	0	0	10 484	3	1 498	3	45 210	6 459	55 694	7 957	0
78	1	55	1	2	0	0	0	1 612	3	1 612	3	1 208	1 208	2 820	2 820	0
112	2	60	5	1	10	0	0	806	1	161	1	1 129	226	1 935	387	0
103	2	65	5	5	80	600	600	7 670	3	1 534	3	3 260	652	10 930	2 186	0
188	1	50	5	1	500	0	0	4 340	3	868	3	7 661	1 532	12 001	2 400	0
85	2	22	2	3	40	20	20	702	1	351	3	1 120	560	1 822	911	0
115	1	41	4	4	0	0	0	2 132	3	533	3	3 051	763	5 183	1 296	0
189	1	23	2	2	110	0	0	9 326	3	4 663	3	5 933	2 967	15 259	7 630	0
116	2	61	4	4	30	0	0	884	1	221	2	1 150	288	2 034	509	0
114	1	32	3	3	1 200	400	400	6 528	3	2 176	3	8 570	2 857	15 098	5 033	0
190	1	28	4	1	10	0	0	12458	3	3 115	3	2 438	610	14 896	3 725	0
117	1	65	6	1	25	0	0	728	1	121	1	3 170	528	3 898	649	0
104	2	7	1	4	100	40	40	1 222	2	1 222	3	320	320	1 542	1 542	0
187	1	46	7	1	2 310	600	600	1 820	3	260	2	8 024	1 146	9 844	1 406	150
186	2	80	9	5	50	1 388	3 172	3 472	3	386	3	9 121	1 013	12 593	1 399	0
106	1	54	5	1	650	40	40	9 470	3	1 894	3	16 760	3 352	26 230	5 246	50
113	2	63	2	5	20	160	160	884	1	442	3	983	492	1 867	934	110
105	1	48	5	5	45	20	20	4 200	3	840	3	775	155	4 975	995	120
39	1	33	5	4	850	9 076	13 972	572	1	114	1	10 412	2 082	10 984	2 196	1 570
41	1	40	2	1	180	0	0	2 664	3	1 332	3	2 612	1 306	5 276	2 638	0
38	1	40	5	1	9 255	13 526	31 672	1 612	3	322	3	11 290	2 258	12 902	2 580	3 000
42	2	45	6	4	15	0	0	754	1	126	1	598	100	1 352	226	0
44	2	37	5	1	5 244	2 616	6 184	7 800	3	1 560	3	3 914	783	11 714	2 343	0
43	2	32	2	1	0	0	0	0	3	0	1	108	54	108	54	0
94	1	71	7	5	2 210	2 576	6 144	20 842	3	2 977	3	5 530	790	26 372	3 767	0
37	2	64	9	5	7 460	14 168	33 792	1 852	3	206	2	1 884	209	3 736	415	0
77	1	80	7	5	4 217	11 558	5 360	2 244	3	321	3	12 246	1 749	14 490	2 070	500
81	2	57	9	1	14	200	200	260	1	29	1	2 130	237	2 390	266	0
80	1	34	6	1	190	2 161	3 232	540	1	90	1	2 479	413	3 019	503	0
67	1	47	9	3	4 400	5 036	13 376	18 928	3	2 103	3	1 916	213	20 844	2 316	470
75	2	27	3	4	2 860	1 488	3 272	4 585	3	1 528	3	5 432	1 811	10 017	3 339	0
76	2	22	6	1	2 210	5 152	12 288	4 762	3	794	3	3 516	586	8 278	1 380	0
71	2	52	4	4	1 030	8 328	19 032	1 222	2	306	3	11 260	2 815	12 482	3 121	0
72	2	42	6	3	3 270	15 536	36 944	4 354	3	726	3	12 427	2 071	16 781	2 797	3 440
66	2	76	8	5	2 008	5 662	5 432	6 444	3	806	3	5 132	642	11 576	1 448	0
69	1	46	10	2	460	1 328	3 112	4 920	3	492	3	3 128	313	8 048	805	0
173	2	28	4	1	0	1 348	3 132	962	2	241	2	570	143	1 532	384	60
101	1	40	10	2	59 760	5 752	3 132	14 100	3	1 410	3	36 960	3 696	51 060	5 106	0

169	2	19	4	1	169	0	0	1 378	3	345	3	685	171	2 063	516	0
171	1	97	4	1	0	0	0	1 878	3	470	3	2 794	699	4 672	1 169	0
123	2	43	6	3	20	0	0	1 872	3	312	3	4 929	822	6 801	1 134	0
102	1	28	4	1	15	40	40	598	1	150	1	900	225	1 498	375	0
124	1	38	4	3	1 220	2 696	6 264	2 478	3	620	3	4 724	1 181	7 202	1 801	1 202
125	1	78	5	3	6 325	8 148	18 852	650	1	130	1	6 100	1 220	6 750	1 350	25
119	1	62	9	5	2 940	10 444	24 716	598	1	66	1	2 048	228	2 646	294	0
121	2	32	4	3	15	0	0	2 098	3	525	3	1 879	470	3 977	2 404	0
120	1	61	9	3	3 865	6 460	15 380	952	2	106	1	2 646	294	3 598	400	0
99	1	44	5	2	575	20	20	6 684	3	1 337	3	12 534	2 507	9 191	3 844	0
170	2	22	1	1	15	0	0	572	1	572	3	1 020	1 020	1 592	1 592	0
100	1	33	6	3	20	2 576	6 144	442	1	74	1	1 400	233	1 842	307	900
174	2	60	7	5	0	100	100	1 144	2	163	1	1 440	206	2 584	369	20
172	1	45	6	1	50	0	0	3 250	3	542	3	95	16	558	558	0
34	1	36	5	2	3 270	7 928	18 632	5 300	3	1 060	3	8 784	1 757	9 844	2 817	0
48	1	71	6	5	1 304	1 708	3 492	3 984	3	664	3	5 790	965	9 774	1 629	0
46	1	39	5	2	23	4 490	10 148	3 532	3	706	3	6 526	1 305	10 058	2 011	0
49	2	46	6	4	0	3 864	9 316	52	1	9	1	1 465	244	1 517	253	0
47	2	37	16	3	2 800	0	0	4 914	3	307	3	16 132	1 008	21 046	1 315	0
35	2	26	6	3	60	1 488	3 272	4 226	3	704	3	6 851	1 142	11 077	1 846	0
36	2	63	8	5	20	0	0	2 704	3	338	3	1 902	238	4 606	576	0
40	1	37	3	4	910	909	1 368	1 586	3	529	3	8 156	2 719	9 742	3 248	0
73	1	59	10	2	217 675	2 576	6 144	19 378	3	1 938	3	83 320	8 332	102 698	10 270	0
79	1	44	5	1	0	1 288	3 072	416	1	83	1	764	153	1 180	236	0
56	2	32	6	4	6 310	4 430	10 088	5 376	3	896	3	5 254	876	10 630	1 772	0
70	1	45	6	2	185	0	0	3 760	3	3	1	5 900	983	9 660	986	0
68	2	74	4	5	95	3 964	9 316	728	1	182	1	2 286	572	3 014	754	0
74	2	36	3	1	25	0	0	0	1	0	1	294	98	294	294	0

gifts =1

salary = 2

business = 3

pension = 4

none = 5

Kwandu annual food expenditure

1 = ≤ 885 severly poor

2 = 886-1 260 poor

3 = ≥ 1 261 well-off

Kwandu annual food expenditure per person, N$

1 ≤ 184.55

2 184.56-262.45 poor

3 ≥ 262.46 well-off

male = 1

female = 2